

# POPULAR SCIENCE

July 1948

25c

**EXCLUSIVE**

**INSIDE STORY  
OF THE  
NEW FORD**

**16** PAGES OF  
PICTURES

**NEW  
DRIVE**

**NEW  
FRAME**

**NEW  
SPRINGS**

**NEW  
POWER**

PAGE 73



# Here's YOUR High School

**Fill in the Gaps in  
Your Education!**

## Increase Your Earning Power!

**25 Subjects of Practical and Cultural Value  
Are in This Book — Study What You Need!**

### GOOD ENGLISH SELF TAUGHT

How to avoid common errors.  
How to improve your vocabulary.

### EFFECTIVE SPEAKING

A practical outline of how to  
speak in public and improve  
everyday speech.

### OUTLINE OF ANCIENT HISTORY

The story of man's earliest civil-  
izations up to the fall of the Ro-  
man Empire.

### OUTLINE OF MEDIEVAL HISTORY

The "Dark Ages" to the begin-  
nings of modern Europe. The Cru-  
sades, the discovery of America.

### OUTLINE OF MODERN HISTORY

From the Reformation, through  
the French Revolution, the Indus-  
trial Revolution, the two world  
Wars, to our day.

### SHORT HISTORY OF THE UNITED STATES

Birth of Colonial America and  
struggle for freedom. Expansion  
and industrial development. Events  
of our times.

### CIVICS AND GOVERNMENT

Our rights and duties as Amer-  
ican citizens. How government op-  
erates—city, state, and national.

### GEOGRAPHY FOR EVERYBODY

A brief tour of the states of our  
country and countries of the world;  
physical, political, and economic  
information.

### ECONOMICS FOR EVERYBODY

How wealth is created; money;  
inflation; laws of supply and de-  
mand; capitalism, socialism, com-  
munism, etc.

### SOCIOLOGY SIMPLIFIED

The social relations of people;  
family life, health, culture, and  
religion.

### A GUIDE TO LITERATURE

A guided tour of English and  
world literature from the ancient  
classics to modern masterworks.

### A GUIDE TO THE ARTS

The art in the museums and in  
life about us. Painting, sculpture,  
architecture, and music.

### MATHEMATICS MADE EASY

Basic operations and short-cuts  
in arithmetic for everyday use in  
the home and business.

### ELEMENTARY ALGEBRA

How algebra provides a shorter,  
faster way to solve mathematical  
problems.

### PLANE GEOMETRY

The famous theorems of the an-  
cient Greeks, and how they are in  
use today.

### FRENCH SELF TAUGHT

An introduction to the most  
widely spoken foreign tongue.  
Easy conversational exercises.

### SPANISH SELF TAUGHT

An outline of this practical lan-  
guage with words and phrases in  
daily use.

### INTRODUCTION TO LATIN

The age-old language of sci-  
ence, medicine, and the Church,  
foremost of the classical tongues.

### BIOLOGY FOR BEGINNERS

The story of life itself. How the  
living organism grows, reproduces,  
and repairs itself.

### PHYSIOLOGY SIMPLIFIED

The nervous system, the organs  
of the body; the vital processes of  
digestion, reproduction, etc.

### PSYCHOLOGY FOR BEGINNERS

Human behavior—emotions,  
sensations, thinking; intelligence  
tests; psychoanalysis.

### CHEMISTRY SELF TAUGHT

Elements and their combina-  
tions. Chemistry in its practical  
applications.

### PHYSICS SELF TAUGHT

Heat, sound, light, magnetism,  
electricity, mechanics, radar, pho-  
toelectric energy, radio, etc.

### ASTRONOMY FOR EVERYBODY

The science of the universe—the  
sun, planets, stars, comets, mete-  
ors, etc.

### GEOLOGY FOR BEGINNERS

How the earth was formed and  
shaped. The basic mineral re-  
sources; weather and climate.

**T**HIS amazing new volume brings to your finger tips every subject contained within the scope of a High School education—presented with crystal clarity in fascinating *readable* form. If you never had a chance to finish school, or if your knowledge is hazy, rusty, in need of a brush-up, this up-to-date book is for YOU. Not only does it contain the subjects taught in High School, but it also includes a complete *Study Outline and Self-Testing Explanations*. No easier, quicker, or more interesting method of self-instruction has ever been devised. All at a cost of less than 16 cents per subject—astonishingly small investment in education.

**New from Cover to Cover!**

**1280 Pages! 300 New Illustrations!**

**T**HIS new and enlarged edition of **HIGH SCHOOL SUBJECTS SELF-TAUGHT** is a more useful book than ever before. New subjects, new illustrations, new full-page maps have been added. Every department has been rechecked, revised and brought up to date by experts. Here is the basis of a broad cultural background—the knowledge expected of you in business, professional and social life—which you can absorb easily and pleasurably, without a school—without a teacher! How unnecessary, now, that feeling of inferiority because of the education you have missed or simply *forgotten*! How unnecessary those embarrassing slips in English; those mistaken ideas of geography; those blunders in history; those blank moments when others talk of science, literature, art, government. You can start with any subject you want first. You can use the *Study Outline* for systematic study in any or all 25 subjects. Just fifteen to twenty minutes a day with this remarkable volume will help make you the well-informed, confident person you want to be!

**Makes Profitable Study a Delightful Leisure Pastime**

*French* and *Spanish*, for instance, are here in *conversational* form, so that you can begin to speak these languages from the first lesson! The essentials of *English*, correct grammar, the right use of words, are presented so you can absorb them quickly. *Mathematics* is so simply explained that you can apply many of its principles almost immediately. *History*, ancient and modern, comes alive with the color and sweep of a great story. *Literature* and *Art*, the masterpieces of all times and all nations, are presented in a way which opens the door to new pleasures. *Physics*, *Chemistry*, *Biology*—the science of life—are so clearly explained that you will absorb the essentials of these subjects without effort. *Nor is this all*. A glance at the full list of 25 subjects in the adjoining column will give you a better idea of the wealth of knowledge offered in this one volume.

**FREE! THIS BRAND NEW 100-PAGE POCKET ENCYCLOPEDIA**



This amazing new Pocket Encyclopedia of Useful Knowledge is packed with information. Among its most interesting sections are such features as *Rapid Figuring*, *The Wonders of the World*, *People of the World*, *Great Writers and Masterworks*, *Famous Compositions*, *Rules of Etiquette*, *First Aid*, *Navigation*, *Rules of Card Games*. Size 3" by 7 3/4". Only handy reference book of its kind in the world. Yours FREE in any case after examining a copy of *High School Subjects Self Taught*.

**plus** Study Guide, Self-Testing Quizzes, and a Comprehensive Index for Quick Reference

**MAIL FREE TRIAL COUPON ON OPPOSITE PAGE**



# Education *made easy!*

**25 Subjects Simplified in One Time-Saving Volume...the Basic Knowledge You Need for Success in Business and Social Life!**

*A Virtual Encyclopedia of Information  
—Reference Index of 7,500 Entries!*

HIGH SCHOOL SUBJECTS SELF TAUGHT is a work of complete authority, prepared by teachers with many years of practical experience. They have been assisted by a staff of editors, skilled in presenting educational subjects in the clearest, most concise, and most readable style. Whether you use the book for systematic self-instruction, for "brush-up," or for general reference, one thing is certain: the practical help, the cultural improvement, the daily usefulness you derive from it will prove to be worth many times its low price!

Less Than **16¢** per subject  
Truly a Bargain in Education!

*All These Subjects in One Volume:*

ANCIENT HISTORY  
MEDIEVAL HISTORY  
MODERN HISTORY  
UNITED STATES HISTORY  
CIVICS AND GOVERNMENT

GEOGRAPHY FOR EVERYBODY  
ECONOMICS FOR EVERYBODY  
SOCIOLOGY SIMPLIFIED

GOOD ENGLISH SELF TAUGHT  
EFFECTIVE SPEAKING  
GUIDE TO LITERATURE  
GUIDE TO THE ARTS

FRENCH SELF TAUGHT  
SPANISH SELF TAUGHT  
INTRODUCTION TO LATIN

MATHEMATICS MADE EASY  
ELEMENTARY ALGEBRA  
PLANE GEOMETRY

BIOLOGY FOR BEGINNERS  
PHYSIOLOGY SIMPLIFIED  
PSYCHOLOGY FOR BEGINNERS  
CHEMISTRY SELF TAUGHT  
PHYSICS SELF TAUGHT

PHYSICS FOR EVERYBODY  
FOR BEGINNERS

7 Million Sold

## HIGH SCHOOL SUBJECTS SELF TAUGHT

Edited by Lewis Copeland  
and a Staff of Experienced Teachers and Editors

A Basic Outline for Those Who  
Wish a High School Education and  
for All Who Want to Bring Their  
Knowledge Up-to-Date!

**25 SUBJECTS**  
with study guide and  
self-testing quizzes

Enlarged Edition  
Completely Revised!  
1280 Pages • 300 Illustrations

Over  
Half a  
Million  
Copies Sold!



**Try It  
5 Days FREE!**

**Pay Nothing Now—Pay Nothing to Postage It At Our Risk and Expense!**

At the coupon attached and mail it at once. HIGH SCHOOL SUBJECTS SELF TAUGHT will be sent to you by return mail. Examine the beautiful binding, the easy-to-read type, the splendid illustrations and take your first few High School lessons with our help. Keep and read the book five days. Then, only then, decide if you wish to own it at the ordinary low price of only \$3.95, plus a few cents more. Easy monthly payments! *The Pocket Encyclopedia of Useful Knowledge* is yours FREE in any case! Doubleday, Inc., Garden City, New York.

### MAIL THIS COUPON TODAY!

Nelson Doubleday, Inc., Dept. 7 PSM, Garden City, New York  
Please send me for FREE TRIAL, a copy of HIGH SCHOOL SUBJECTS SELF TAUGHT, new and enlarged edition. Within 5 days, if not completely satisfied, I may return the book without further obligation. If I keep it, I will send you a first payment of only 99 cents, plus postage, and \$1.00 a month thereafter until the total price of \$3.95 is paid.

Also send me FREE THE POCKET ENCYCLOPEDIA OF USEFUL KNOWLEDGE, which is mine to keep as a gift IN ANY CASE.

Mr. \_\_\_\_\_  
Mrs. \_\_\_\_\_  
Miss \_\_\_\_\_  
Address \_\_\_\_\_

City and Zone \_\_\_\_\_ State \_\_\_\_\_

Occupation \_\_\_\_\_ If under 21, age please \_\_\_\_\_

☐ SAVE POSTAGE. Check here if enclosing with coupon remittance of \$3.95, in which case, WE will pay postage. Same return privilege; refund guaranteed.

Same Price in Canada: 105 Bond St., Toronto 2



FOUNDED 1872



VOL. 153: NO. 1

# POPULAR SCIENCE

MECHANICS AND HANDICRAFT REG. U.S. PAT. OFF. **Monthly**

**EDITOR:** Perry Githens

**MANAGING EDITORS:** Fred O. Newman, Volta Torrey. **ART EDITOR:** Howard C. Jensen.

**MECHANICS & HANDICRAFT EDITOR:** Harry Walton.

**ASSISTANT MANAGING EDITORS:** Hartley E. Howe, Frank Rowsome, Jr.

**ASSOCIATE EDITORS:** Howard Allaway, Alden P. Armagnac, Devon Francis, Robert Gorman, Sheldon Gallagher, Herbert Johansen, Martin Mann, Denis Sneigr, Robert P. Stevenson.

**STAFF PHOTOGRAPHERS:** W. W. Morris (Chief), Hubert Luckett, Orlando Guerra (Darkroom).

**WESTERN EDITOR:** Andrew R. Boone (Los Angeles).

**ART DIRECTOR:** Harry Samuels. **ART ASSOCIATES:** Herbert Anthony, Eric Karminski, Jr., Richard Meyer, Saverio Rada, Frances Cooper (Production).

**EDITORIAL ASSISTANTS:** Mae G. Dyer (Assistant to the Editor), Julia Charnif, Carol Ennis, Charlotte Korch, Georgette Sparks, Ruth Westphal.

**WASHINGTON CORRESPONDENT:** John F. Loosbrock

**PUBLISHER:** Godfrey Hammond

## CONTENTS FOR JULY, 1948

*Cover painting by Ray Pioch*

### Science News

Predicts Position of Moon.....	106
Artificial Raindrop.....	107
Unspared Rod.....	107
Super-Microscopes to Open New World	122

### Science at Work

Navy Gets Big Pressure Room.....	94
"Spider" Spins Power.....	98
Mass-Produced Turbines.....	99
Sparks Measure Voltage.....	99
Cage Tests Grates.....	105
Soil Preserved Intact.....	107
New Door Resists Fire.....	112
Lab Perches on Tower.....	121
Oilmen Make Swamps Talk.....	126
The Horn That Shouts Like a Man.....	129
World's First Clam Farm.....	134

### PS Features

The Inside Story of the New Ford.....	74
Crane Sets Up Wall.....	94
New Machines Fight Forest Fires.....	95
Behind the Lights At a Night Ball Game	100
I Painted My Car With a Mitten.....	108
5th Wheel for Safer Driving .....	116
New Entries In the Olympics.....	118
Tiny Cars Race Like Big Ones.....	133
You Can't Escape Cosmic Rays.....	139
Doctor Models Machines.....	210

### Aviation

Laying 100 Hands on a Plane.....	88
Flying in Red and Green Air.....	91
What's New in Aviation.....	96
Wet "Wind" Tunnel.....	106
Fuel for the Tanks of the B-50.....	119

### Automobiles

Under the Hood.....	73
Motoring Taught Like Flying.....	111
Rickshaw Gets a Motor.....	145
Hints from the Model Garage.....	146
Gus Races Trouble to the Wire.....	148
New Soft Tire Absorbs Bumps.....	152
Cooler Improves Car Comfort.....	154
Car-Top Carrier Adds Luggage Space....	175
Engine Heats Baby's Bottle.....	214
Hydraulic Tractor Seat.....	215

### Inventions

Records Any Language.....	98
New Ideas from the Inventors.....	114
New Gadgets Aid Home Safety.....	128

### New Products

Cartridge Loads Recorder.....	90
Anchor Buries Itself.....	98
New Paper Won't Burn.....	122
Crane Aids Rug Cutter.....	132
Pen Writes on Steel.....	138

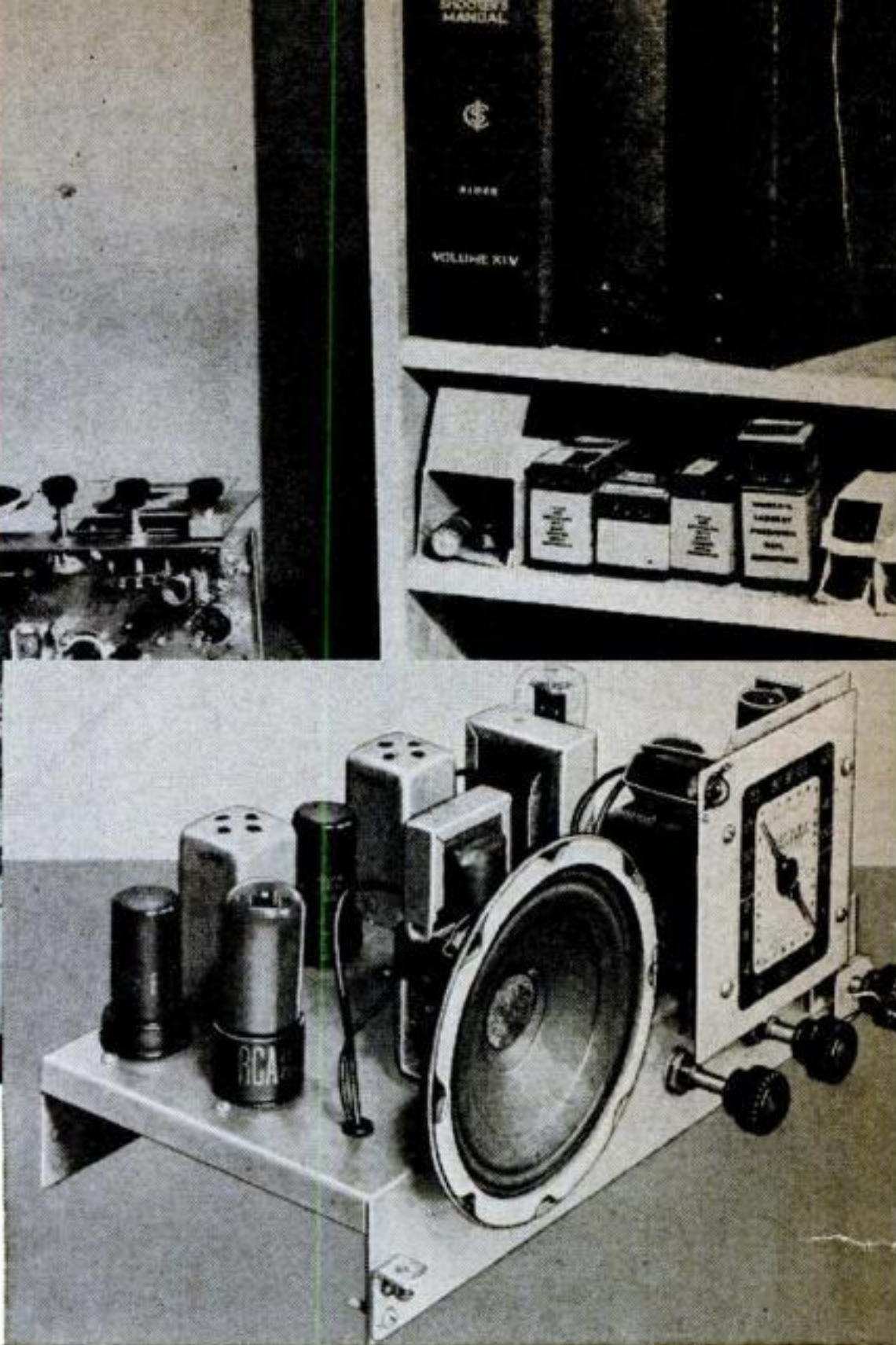
Ⓢ This mark in text indicates Trade Name.

Continued on page 4 Fill ou

Popular Science is published monthly at 353 Fourth Avenue, New York, N. Y., by Popular Science Publishing Co., Inc. Godfrey Hammond, President and Treasurer; R. C. Wilson, Raymond J. Brown, Stephen P. Glennon, Vice-Presidents; F. W. Briggs, Secretary. Entered as second-class matter Dec. 28, 1918, re-entered as second-class matter February 11, 1948, at the Post Office in New York, N. Y., under the act of March 3, 1879; additional entry as second-class matter at Dayton, Ohio. Entered as second-class matter at the Post Office Department, Canada. Printed in U.S.A. Copyright, 1948, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all countries participating in the International Copyright Convention and Pan American Copyright Convention. Yearly subscriptions to United States, its possessions and Canada, \$2.50 (2 years, \$4.50; 3 years, \$6.00); foreign countries \$1 per year extra. Subscribers must notify us of change of address four weeks in advance of the publication date. Be sure to give both old and new addresses, including zone numbers. Vol. 153: No. 1.

SCHO  
you by  
clear  
maps.  
compli  
and or  
extrao  
W ig  
1 d  
on





## New I.C.S. Course Simplifies Radio Training

THE BEGINNER IN RADIO no longer has to stumble over technical explanations — or sidestep involved theories — in acquiring the training he needs to become a successful repairman.

These are carefully worked out for him in clear, simple language in a new home-study course developed by International Correspondence Schools.

But the student doesn't stop here. He puts principles and theories to work —

using professional-quality tools and radio equipment supplied with the course. During his studies he assembles, wires and tests a modern 6-tube, 2-band receiver.

Long before his last lesson, the average student is in a position to start making his training pay. And by the time he completes the course, he is well equipped — in knowledge, tools and radio parts — for a good job in radio or a profitable service business of his own.



**INTERNATIONAL  
CORRESPONDENCE SCHOOLS**  
Box 7609-M, Scranton 9, Pa.

Those who want to make good in Radio—who want a course that is complete, up-to-date, extremely practical — would do well to mail this coupon. Do it now!

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Age \_\_\_\_\_ Occupation \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to \_\_\_\_\_ P.M.

Without cost or obligation please send me full information on the courses before which I have marked X.

☐ **RADIO SERVICING (with training equipment)**

- |  |  |
|--|--|
| <input type="checkbox"/> Radio, General        | <input type="checkbox"/> Electrical Engineering  |
| <input type="checkbox"/> Radio, Operating      | <input type="checkbox"/> Lighting Technician     |
| <input type="checkbox"/> Electronics           | <input type="checkbox"/> Practical Electrician   |
| <input type="checkbox"/> Practical Telephony   | <input type="checkbox"/> Business Administration |
| <input type="checkbox"/> Telegraph Engineering | <input type="checkbox"/> Salesmanship            |



# the GOING is better with PYROIL

The secret to long motor life is lubrication—and the secret of lubrication is the constant maintenance of an oil film between moving metal surfaces. The difficult lubrication spot in your car is the surface between piston and cylinders. Park your car and the surface drains dry—start it and metal rubs metal to produce wear. Pyroil gives oil the property of *clinging to metal surfaces*. Ask your gas station attendant to add PYROIL—and add miles to your car.

## GIVEN!

An attractive Pyroil metal savings bank—takes coins up to 50¢ pieces—is yours for the asking—sent postage paid.

## PYROIL FOR AIRCRAFT ENGINES

Use Aircraft Pyroil B for lubricating oil. Aircraft Pyroil A for gasoline.

Manufactured and guaranteed by

**PYROIL COMPANY**

331 Main Street, La Crosse, Wisconsin

Canadian Distributors:  
Central Purchasing Agencies,  
Ltd., Toronto, Ontario



## PYROIL COMPANY

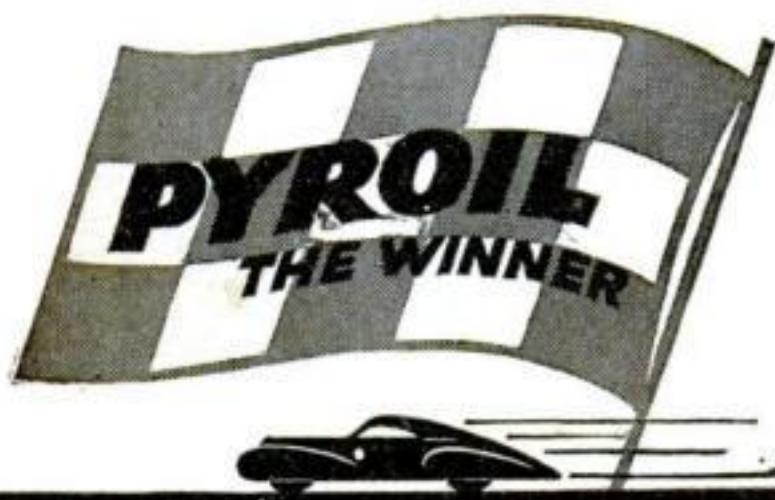
331 Main Street, La Crosse, Wisconsin

I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

Name.....

Address.....

City or Town.....State.....



New Slabs Speed Building, Cut Cost.....	144
Shingle Packet Aids Repairs.....	174
Flashing Materials in Handy Package.....	202
Tractor Moves Between Rows.....	203

## Photography

Movie Camera Dances.....	105
Navy Camera Makes Light Look Slow....	136
Shoot Late for Striking Photos.....	188
Darkroom Fits the Case.....	191

## Mechanics & Shopwork

Toy Turbines Made of Paint Cans.....	177
Power Tools Bevel and Chamfer.....	178
Indexing Head for Drill Press.....	183
Chisel Holder Spares Your Knuckles.....	184
Collet Holds Lathe Cutters.....	185
Restoring Accuracy of Miter Gauge.....	201
Boy's Tractor Like Dad's.....	210
Vibrator Adapted as Engraver.....	211
Balance Tips at Half a Grain.....	212

## Home Mechanics & Handicraft

Wire Enriches Lathe Projects.....	156
Spanish Sandals for Beach Wear.....	158
Flame Shapes a Glass Menagerie.....	160
Lamp is "Carved" on Jigsaw.....	163
Bicycle Boat Built for Two.....	164
Midget Brass Watering Can.....	172
Kitchen Bin Stores Vegetables.....	174
Scoop Fills Tobacco Pouch.....	176
Polish Can Holds Chalk Line.....	203
Homemade Fans Beat the Heat.....	204
Water Toy Amuses Child.....	209
Wire Brings Live Bait to Hand.....	209
Dinosaur Guards Desk Pen.....	211
Wire Holder Protects Bristles.....	214
Insulating Board Saves Bench.....	215
Plywood Kitchen Eases Camp Work.....	216

## Radio & Electricity

Subway Guide Lights Up.....	105
Button Cuts Radio Gab.....	132
Auto Radio Plays in Car or Out.....	194
News in Electronics.....	199
Flat on Idler Bumps Turntable.....	200
Troubles Traced to Condensers.....	200
Switch Near Phone Cuts Radio.....	200

## Departments

Letters.....	16
The Voice of Science.....	71
I'd Like to See Them Make.....	120
What's Your Ingenuity Quotient?.....	159
Keeping the Home Shipshape.....	168
Aids to Modern Living.....	170
New Tools.....	182
New Shop Ideas.....	186
Photo Ideas and Equipment.....	192
Editorial Memo.....	270



# MORE MONEY \$\$\$ a BETTER JOB



**YOU'RE** in the biggest competition—yes, the biggest battle in the world—that of making a living. You have to work for a liv-

ing—so does everyone else. Competition for promotion is keen—people all around you are looking for more money—a better job—and so are you.

You can get a head start. Other men have—and in a short time you should be able to out-distance those who have no progress plan, make more money—have a better job—a more certain future.

Few people prepare themselves for that promotion—that better job and more money. Not many are making any special effort to learn outside of the time they put in each day on their work. They're taking the long, hard road to success. *How about you?* Are you, too, taking that same old, winding road—with its many disappointments and heartbreaks?

Here at LaSalle we have been training ambitious men and women for success for 40 years—enrolled hundreds of thousands of students—and our files overflow with grateful letters from students who have attained success and earnings far beyond their fondest dreams.

Perhaps we can help you—at any rate it will be well worth a three cent stamp to mail the coupon below. **DO IT NOW!** Just check the field of your choice and we'll send you full information on that field without obligation. It may be the turning point in your life to a successful career, and more money.



**Your Competition is Keen**



**LASALLE** EXTENSION UNIVERSITY  
A Correspondence Institution  
417 SO. DEARBORN ST.  
DEPT. 783-R  
CHICAGO 5, ILL.

I am interested in preparing myself for a better job and more money. Please send me your free 48-page booklet on the training course I have checked below.

ACCOUNTANCY

MODERN EXECUTIVE

INDUSTRIAL MANAGEMENT

TRAFFIC MANAGEMENT

MODERN FOREMANSHIP

LAW

<input type="checkbox"/> Accounting	<input type="checkbox"/> Industrial Management
<input type="checkbox"/> Bookkeeping	<input type="checkbox"/> Business Management
<input type="checkbox"/> Business Correspondence	<input type="checkbox"/> Traffic Management
<input type="checkbox"/> Sales Training	<input type="checkbox"/> Stenotypy
<input type="checkbox"/> Law: LL.B. Degree	<input type="checkbox"/> Machine Shorthand
<input type="checkbox"/> Foremanship	
<input type="checkbox"/> C. P. A. Coaching	

Name

Age

Present Position

Street Address

City, Zone and State

**CLIP AND MAIL THIS COUPON TODAY!**





## AIRPLANE and ENGINE MECHANICS

## COMPLETE PILOT TRAINING

SEND COUPON FOR BOOKLET IN COLOR

### EMBRY-RIDDLE OFFERS:

- MODERN hangers, classrooms, shops and airplanes
- EXPERIENCE gained over a quarter of a century of aviation training
- LIVING Facilities on the airport

Embry-Riddle graduates get good jobs!  
DON'T DELAY -- WRITE TODAY!

Dean of Enrollments -- Dept. 71  
Embry-Riddle School of Aviation  
MIAMI 30, FLORIDA  
*Please Print*

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Age \_\_\_\_\_

☐ Veteran ☐ Non-Veteran } Check One

#### TECHNICAL COURSES

Airplane and Engine  
Mechanics (A&E)... ☐  
Design Engineering  
& Maintenance... ☐  
Aeronautical Drafting  
& Design... ☐  
Radio & Electronics... ☐

#### COMBINATION COURSES

Flying Mechanic... ☐  
A&E with Commercial... ☐

#### FLIGHT COURSES

Private Pilot... ☐  
Commercial Pilot... ☐  
Flight Instructor... ☐  
Instrument Rating... ☐  
Multi-Engine Rating... ☐



*International*  
**SCHOOL OF AVIATION**  
MIAMI 30, FLORIDA

**TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD**





Are you getting ahead the hard way  
or taking this **EASIER** road? . . .

TO EXPERIENCE AND SUCCESS



Trial and error learning is difficult . . . It's a *slow, uncertain* way to attain the skill necessary for success. Why not take the easier road . . . the quick, sure way offered to you by books?—books that give you in a *few weeks* know-how that generally takes a *life-time* to acquire "on your own." In the volumes below you get the practical knowledge of expert craftsmen . . . *the leaders in their professions*. Consult them to prepare for the top-salary jobs . . . use them to start training yourself *right now*. Mail the handy coupon below for FREE-TRIAL copies of books you wish to examine for 10 days on approval.

Pay while you learn. See special installment plan outlined below.

HERE ARE BOOKS THAT PREPARE YOU FOR QUICK ADVANCEMENT —

**1. CARPENTRY  
FOR THE BUILDING TRADES**

By E. A. Lair. Gives expert instructions on how to plan and do carpentry work for all kinds of house building and remodeling. Covers the latest FHA-approved methods. 188 pages. \$2.50.

**2. BRICK STRUCTURES  
—HOW TO BUILD THEM**

By R. P. Stoddard. This manual supplies detailed information on selection of brick and preparation of mortar, and gives step-by-step methods for constructing residences, fireplaces, walks, walls, etc. 169 pages, 100 illustrations. \$2.20.

**3. MATHEMATICS  
for Electricians and Radiomen**

By N. M. Cooke. The mathematical background you need to solve everyday electrical and radio problems. Teaches you elementary algebra, logarithms, trigonometry, vector computation, and other practical mathematics, and shows how to apply your knowledge to radio and circuit problems. 604 pages. \$4.50.

**4. Elements of  
RADIO SERVICING**

By W. Marcus and A. Levy. This radio repairman's handbook guides you through every step of servicing—how to set up a signal generator, and how to check troubles in every stage of the modern superheterodyne A-M and F-M receiver. 475 pages. \$4.50.

**5. RADIANT HEATING**

By R. W. Shoemaker. Provides the home builder with all the facts of radiant heating—how it differs from conventional methods, how to design systems, and how to install radiant heating in all types of buildings. 306 pages. \$4.00.

**6. WELDING  
and Its Applications**

By B. E. Rossi. This book shows you how to weld, shape, finish, and cut metals by any process. Covers both electric arc and oxyacetylene processes . . . metallurgy . . . and testing and inspection methods. 343 pages. \$3.50.

**7. INTRODUCTORY SHOPWORK**

By M. M. Jones and A. Axlerod. Here is a handy manual that shows you how to use and care for tools—saws, planes, chisels, metal working tools, drills, etc.—and how to do the fundamental jobs in furniture making and other household repairs. \$3.00.

**8. SHEET-METAL  
PATTERN DRAFTING**

By F. J. O'Rourke. Practical instruction in laying out sheet-metal patterns for all types of jobs. Gives step-by-step methods for solving every problem you're apt to meet in piping, roofing, aircraft, etc. 189 pages. \$2.20.

**9. AIR CONDITIONING  
and Elements of Refrigeration**

By S. P. Brown. This book shows you how to calculate heating and cooling requirements and how to heat, cool, and ventilate any building. Contains theory, practical application, and design data. 655 pages. \$6.00.

**10. Successful SOLDERING**

By L. S. Taylor. A concise, clear handbook of soldering techniques. Tells how to get the best results in soldering black iron, zinc, steel, and other metals. 76 pages. \$2.00.

**11. Industrial ELECTRICITY  
and WIRING**

By J. A. Moyer and J. F. Wostrel. Covers the whole field of electrical wiring from fundamental theory to handling all types of modern installations . . . transformers, appliances, motors, generators, etc. 541 pages. \$3.50.

**12. Household Electric  
REFRIGERATION**

By J. F. Wostrel and J. G. Praetz. This manual provides every fact needed by the refrigerator serviceman. Covers installation, testing, and repairing of popular refrigerators, showing how each system operates. 472 pages. \$4.50.

SEE THESE BOOKS **FREE**  
10 DAYS

How to get the books you need  
RIGHT AWAY without big cash outlay

- Build your library on our convenient installment plan.
- Examine any of these books for 10 days free—return those you don't need and pay for the rest as you use them.
- Don't deny yourself these valuable books because you lack ready cash. Get them now under a plan that fits your budget.

SEND THE COUPON TODAY

McGRAW-HILL BOOK CO., Inc., 330 W. 42d St., NYC 18

Send me books circled below for 10 days' free trial. In 10 days I'll return books I do not want, and remit first monthly installment, plus few cents postage. I understand the first installment will be at least one-sixth the total price of books retained, balance payable in equal installments every 30 days. (Minimum payments, \$3.00. Total account to be settled in six months.)

1 2 3 4 5 6 7 8 9 10 11 12

Name.....

Address.....

City and State.....

Company..... Position..... PSM-7-48





**THOUGHTS HAVE WINGS**

## You Can Influence Others With Your Thinking

**TRY IT SOME TIME.** Concentrate intently upon another person seated in a room with you, without his noticing it. Observe him gradually become restless and finally turn and look in your direction. Simple—yet it is a *positive demonstration* that thought generates a mental energy which can be projected from your mind to the consciousness of another. Do you realize how much of your success and happiness in life depend upon your influencing others? Is it not important to you to have others understand your point of view—to be receptive to your proposals?

How many times have you wished there were some way you could impress another favorably—*get across to him or her your ideas?* That thoughts can be transmitted, received, and understood by others is *now* scientifically demonstrable.

## This FREE Book Points the Way

The tales of miraculous accomplishments of mind by the ancients are now known to be fact—not fable. The method whereby these things can be **INTENTIONALLY**, not accidentally, accomplished has been a secret long cherished by the Rosicrucians—one of the schools of ancient wisdom existing throughout the world. Write for the free copy of the fascinating sealed book, **"THE MASTERY OF LIFE,"** which explains how you may receive this unique wisdom and benefit by its application. Address: Scribe F. D. K.

## The ROSICRUCIANS

San Jose, (AMORC) California

### USE THIS COUPON

Scribe F.D.K.  
The Rosicrucians  
San Jose, California

I am sincerely interested in an intelligent method of attaining a mastership of life. Send me without obligation, your **FREE** Book which explains how I may receive and use your age-old method.

Name.....  
Address.....  
City.....

**Down AND feather FILLED** **SLEEPING BAGS**  
**COMPLETE IN ONE PIECE**  
Now only **\$13.99** **BRAND NEW**



Arctic type, mummy style. Water repellent. Comes in one piece complete. Filled with genuine down, crushed and fibre chicken feathers. Zipper opening. O. D. Poplin top. Weighs only 7½ lbs. Add 35c postage.



**U.S. ARMY Surplus**  
**MCCLELLAN**  
**SADDLES**

### BRAND NEW

Worth at least \$60.00. Top grade russet cowhide. 12 in. seat. Hair girth. Complete ready to use. Weighs 23 lbs. Add \$1.00 postage.

**\$16.99**

**ORDER BY MAIL**  
Please send remittance with order. Include postage. Absolute satisfaction or your money back.

**SIoux FALLS**  
**SURPLUS STORE**  
SIoux FALLS, S.D.

**SEND FOR FREE War Surplus CIRCULAR**

**THE GREATEST THING**

**IN PLASTICS!**

**PLASTICAST**



**PLASTICAST** is a liquid plastic; can be poured into ANY kind of mold or container. Hardens in a few minutes into a transparent solid, clear-as-glass, tough-as-steel plastic! As easy to use as pouring water out of a glass! No tools or machinery required. Ideal for imbedding flowers, butterflies, photos, souvenirs, and for making beautifully brilliant jewelry, gems, displays, fishing lures, magnifiers, lenses, knick-knacks and novelties. Easily cast into sheets, rods or blocks. ANY shape. ANY color. **EVERYTHING FURNISHED** including molds for making **PENDANT HEARTS, ENCHANTED GARDENS, MAGNIFYING GLASSES, etc.**, sufficient materials included for making about \$100.00 worth of novelties! For **FUN** or **PROFIT**, start **TODAY**. C.O.D. orders accepted with \$1.00 deposit. Postpaid U.S.A. & Canada only. The **ONLY** outfit on the market containing molds!

**COMPLETE MASTER OUTFIT—\$3.50**  
**SPECIAL OFFER**

**FREE**

A very attractive and useful novelty made with one of our plastics given absolutely free with every one of our catalogs! Catalog lists hundreds of new materials for making **MOLDS** and **CASTINGS** with Liquid Plastics, Liquid Ivory, Liquid Marble, Wax, Latex, Metal, Castwood, etc. Big selection of rubber molds. Price of catalog only 10c coin or stamps.

**PLASTICAST CO. (Dept. A)**  
5961 Madison St. We have no retail store—  
Chicago 44, Illinois order by mail only. P. O. Box 987  
Palo Alto, Calif.



## AUDELS REFRIGERATION & AIR CONDITIONING GUIDE.....\$4

New from Cover to Cover—1280 Pages, Fully Illus. Covering basic principles, servicing, operation & repair of household, commercial & industrial refrigeration & air conditioning. A gold mine of essential important facts for engineers, servicemen, users.

## AUDELS CARPENTERS & BUILDERS GUIDES—4 Vols. ....\$6

A practical illustrated trade assistant on modern construction for carpenters, joiners, builders, mechanics and all woodworkers. 4 vols., 1600 pages, 3700 illustrations, flexible covers. Pocket size. Each volume sold separately \$1.50 a vol.

## AUDELS AUTOMOBILE GUIDE.....\$4

A practical quick ready reference book for auto mechanics, service men, operators & owners. Explains theory, construction & servicing of modern motor cars, trucks, buses & auto type Diesel engines. 1700 pages, fully illustrated. 55 chapters. Indexed. A standard book for mechanics. New fluid drive covered.

## AUDELS DIESEL ENGINE MANUAL.....\$2

A practical, concise treatise with questions and answers on the theory, operation and maintenance of modern diesel engines including General Motors 2 cycle Diesel. 384 pages, fully illus., flexible binding, pocket size. All details plainly brought out, this book is of extreme value to engineers, operators & students.

## AUDELS WIRING DIAGRAMS.....\$1

210 Pages, Illustrated. Gives practical facts on wiring of electrical apparatus. It shows clearly how to wire apparatus for practically all fields of electricity. Each diagram is complete & self-explanatory. Highly Endorsed Pocket Companion.

## AUDELS PLUMBERS & STEAMFITTERS GUIDES—4 Vols. ....\$6

A Practical Trade Assistant & Ready Reference. Explains in plain language & by clear illustrations, diagrams, charts, graphs, pictures principles of modern plumbing practice including Marine Pipe Fitting and Air Conditioning. 4 Vols.—1670 Pages—3642 Diagrams. Pocket size. Each Vol. Sold Separately \$1.50 a Vol.

## AUDELS SHEETMETAL WORKERS HANDY BOOK.....\$1

Practical inside information. Fundamentals of Sheet Metal Work. 388 pages. Illustrated. 11 sections. Clearly written. Essential & important facts, figures, pointers in everyday language. Ref. Index.

## AUDELS SHEETMETAL PATTERN LAYOUTS.....\$4

Developed by Experts for Sheet Metal Workers, Layout Men & Mechanics. A Practical Encyclopedia in 10 Sections, size 7 x 10 x 2—1125 Pages—350 Layouts—1600 Illustrations, 1001 Key Facts. Fully indexed for ready reference in answering your layout problems. Covers all phases of sheet metal work including Pattern Cutting, Pattern Development & Shop Procedure.

## AUDELS ANSWERS ON BLUE PRINT READING.....\$2

For Mechanics & Builders. Covers all types of blue print reading including ship & airplane. 416 pages, fully illustrated.

## AUDELS NEW MACHINIST & TOOLMAKERS HANDY BOOK.....\$4

Covers modern machine shop practice in all its branches. 5 practical books in 1. New from cover to cover. Tells how to set up & operate lathes, screw and milling machines, shapers, drill presses and all other machine tools. 1600 pages, fully illustrated, 5 x 6 1/2 x 2. Indexed. 5 sections. 1—Modern Machine Shop Practice. 2—Blue Print Reading & How to Draw. 3—Calculations & Mathematics for Machinists. 4—Shop Physics. 5—How to Use the Slide Rule. 60 chapters. Easy to read and understand. A shop companion that answers your questions.

## AUDELS MATHEMATICS & CALCULATIONS FOR MECHANICS \$2

Mathematics for home study or reference. 700 pages, 550 illus. Practical mathematics from beginning. How to figure correctly. Easy, correct methods covering complete review. Illus. & Indexed.

## AUDELS HANDY BOOK OF PRACTICAL ELECTRICITY.....\$4

For maintenance engineers, electricians & all electrical workers. 1440 Pages, 2600 Illus. Covers important electrical information in handy form—including Marine Wiring, Radio Principles, Welding. Indexed. A Key to a practical understanding of electricity.

## AUDELS RADIOMANS GUIDE.....\$4

A key to the practical understanding of radio including Frequency Modulation, Television, etc., Aircraft & Marine Radio. For radio engineers, servicemen, amateurs. 914 Pages, 633 Illustrations & Diagrams. Photos. Review Questions & Answers, Reference Index. Authentic, clear, concise.

## AUDELS ELECTRONIC DEVICES.....\$2

Tells What You Want to Know About Electric Eye. Easily Understood. Covers photo-electric cells & their applications. Amplifiers, illumination, frequencies, voltage, photocell, tubes, Ohm's Law, wiring diagrams, etc.

## AUDELS WELDERS GUIDE.....\$1

A concise, practical text on operation & maintenance of all welding machines for all mechanics. Over 400 pages, illustrated. Covers all methods of electric and acetylene welding including airplane work.



## AN AUDEL GUIDE IS A GOOD FRIEND!

Step Up Your Own Skill with the Practical Facts and Figures of Your Trade. Save time and money with right methods, short cuts, labor saving ideas. CHECK NOW! You can look over any Audel Guide in your home. Start the Easy Payments if satisfied.

# CUT HERE MAIL ORDER

AUDEL, Publishers, 49 W. 23 St., New York 10, N. Y.

Please mail me for 7 days' free examination the books marked (X) below. I agree to mail \$1 in 7 days on each book or set ordered, and to further mail \$1 a month on each book or set ordered until I have paid purchase price.

If I am not satisfied with Guides I will return them.

- |  |     |
|--|-----|
| <input type="checkbox"/> Audels HOUSE HEATING GUIDE                        | \$4 |
| <input type="checkbox"/> Audels ELECTRIC MOTOR GUIDE                       | 4   |
| <input type="checkbox"/> Audels OIL BURNER GUIDE                           | 1   |
| <input type="checkbox"/> Audels REFRIGERATION & Air Conditioning Guide     | 4   |
| <input type="checkbox"/> Audels POWER PLANT ENGINEERS GUIDE                | 4   |
| <input type="checkbox"/> Audels PUMPS, HYDRAULICS & AIR COMPRESSORS        | 4   |
| <input type="checkbox"/> Audels WELDERS GUIDE                              | 1   |
| <input type="checkbox"/> Audels BLUE PRINT READING                         | 2   |
| <input type="checkbox"/> Audels SHEET METAL WORKERS Handy Book             | 1   |
| <input type="checkbox"/> Audels SHEET METAL PATTERN LAYOUTS                | 4   |
| <input type="checkbox"/> Audels AIRCRAFT WORKER                            | 1   |
| <input type="checkbox"/> Audels MATHEMATICS and CALCULATIONS               | 2   |
| <input type="checkbox"/> Audels MACHINISTS & TOOLMAKERS Handy Book         | 4   |
| <input type="checkbox"/> Audels MECHANICAL Dictionary                      | 4   |
| <input type="checkbox"/> Audels AUTOMOBILE GUIDE                           | 4   |
| <input type="checkbox"/> Audels DIESEL ENGINE MANUAL                       | 2   |
| <input type="checkbox"/> Audels MARINE ENGINEERS Handy Book                | 4   |
| <input type="checkbox"/> Audels MECHANICAL DRAWING GUIDE                   | 1   |
| <input type="checkbox"/> Rogers MECHANICAL DRAWING and DESIGN              | 2   |
| <input type="checkbox"/> Audels MILLWRIGHTS and Mechanics Guide            | 4   |
| <input type="checkbox"/> Audels CARPENTERS and Builders Guides (4 vols.)   | 6   |
| <input type="checkbox"/> Audels PLUMBERS and Steamfitters Guides (4 vols.) | 6   |
| <input type="checkbox"/> Audels MASONS and Builders Guides (4 vols.)       | 6   |
| <input type="checkbox"/> Master PAINTER and DECORATOR                      | 2   |
| <input type="checkbox"/> Audels GARDENERS & GROWERS GUIDES (4 vols.)       | 6   |
| <input type="checkbox"/> Audels ENGINEERS & FIREMANS EXAMINATIONS          | 1   |
| <input type="checkbox"/> Audels ENGINEERS and Mechanics Guides (8 vols.)   | 12  |
| <input type="checkbox"/> Audels Answers on Practical ENGINEERING           | 1   |
| <input type="checkbox"/> Audels ELECTRICIANS EXAMINATIONS                  | 1   |
| <input type="checkbox"/> Audels WIRING DIAGRAMS                            | 1   |
| <input type="checkbox"/> Audels Handy Book of PRACTICAL ELECTRICITY        | 4   |
| <input type="checkbox"/> Audels ELECTRICAL POWER CALCULATIONS              | 2   |
| <input type="checkbox"/> Audels ELECTRONIC DEVICES                         | 2   |
| <input type="checkbox"/> Audels ELECTRIC Dictionary                        | 2   |
| <input type="checkbox"/> Audels RADIOMANS GUIDE                            | 4   |
| <input type="checkbox"/> Audels NEW ELECTRIC LIBRARY at \$1.50 a Volume    |     |
| Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII                     |     |

Name.....

Address.....

Occupation.....

Employed by..... PSM

AUDEL, Publishers, 49 W. 23 St., N. Y. 10



# Paint Your Car for ONLY \$3.95

ONE QUART DOES ENTIRE JOB

WITH **WYPE** TRADE MARK REG.

NO SPRAYING · NO MASKING · NO BRUSHING

AMAZING NEW BRUSHLESS  
**AUTO ENAMEL**  
You **JUST WIPE ON**  
with a **POWDER PUFF**  
instead of Brushing or Spraying



ANYONE  
CAN DO  
BEAUTIFUL  
JOB

**Get Beautiful Mirror Like Finish  
That Looks Like Spray Job!**

**Dries Dust Free One Hour · No Streaks or Lapmarks**

At last! Practically anyone can now paint his car with WYPE! No previous car-painting experience necessary. You get a beautiful high-gloss job that gives you an expensive finish such as is sprayed on by Professional Auto Painters—at a fraction of regular cost! With WYPE you need **NO BRUSH, NO SPRAY, NO MASKING!** Just **WIPE ON** with Powder Puff—which we furnish at no extra charge. You get a brilliant, glossy finish that is truly "factory-like." No streaks. No lap-marks. Guaranteed for TWO years not to crack, peel, chip or fade, if simple directions are followed. Takes about an hour to apply. Dries dust-free in an hour. WYPE comes in nine most popular shades including those on newest model cars. Goes over any other color, lacquer or enamel.

## MOST POPULAR COLORS

Black Brewster (dark) Green  
Maroon Jewel (light) Green  
Red Washington (dark) Blue  
Gray Monticello (light) Blue  
Sun Beige (light) Tan

**\$3.95**  
Per Quart

**SEE YOUR DEALER or ORDER DIRECT  
SEND NO MONEY · Get WYPE Today!**

If your dealer can't supply you, just send us a postcard. We'll ship C.O.D. Just pay mailman for Wype, plus postal charges. Or send remittance with order and WE pay postage.

**You're SURE  
You Are SAFE  
when You Paint  
with WYPE  
HERE'S WHY!**

**TESTED BY  
U. S. Testing Co., Inc.**

**Leading Scientific  
Testing Laboratory**

Report No. 87496  
Jan. 5, 1948

and found to conform  
to the claims and  
guarantee of the Wype  
Corporation.

No higher or more rigid standards are set by any Testing Laboratory. United States Testing Company conducts scientific tests for the world's foremost organizations and is accepted as a leading authority on such tests.

## For Your Protection

Before you buy any automobile paint, ask for proof that it has passed tests by a nationally known testing laboratory. Remember the value of your car! You can **TRUST Wype.**

## 2-YEAR GUARANTEE

We Guarantee WYPE against cracking, peeling, fading or chipping for two years after application, if applied according to directions furnished. Your money cheerfully refunded if WYPE does not live up to this Guarantee.

COPYRIGHT 1948, WYPE CORP



**APPLY in ONE HOUR —  
DRIES to GLISTENING  
PROFESSIONAL FINISH**

WYPE is a new Miracle Enamel for Autos. It is NOT a wax or polish but a hard high lustre ENAMEL finish! With WYPE, ANYONE can do a beautiful job! Order a quart to paint your car or to get started in this BIG-MONEY Business!

**NO STREAKS OR LAPMARKS  
LOOKS LIKE SPRAY JOB**

## WANTED WYPE DEALERS

**WYPE 2 Cars Daily  
at \$25 Each—Gross  
Up to \$260 Weekly**

Start making BIG MONEY now! Sell WYPE in cans or go into business painting cars yourself (or hire others). Send for FREE details of powerful money-making plan. Why wait? Start now by ordering one quart or more of WYPE today!

**OVER 200,000  
CARS PAINTED  
WITH WYPE**

and thousands more being painted every week. The final test of customer satisfaction—thousands of our new customers are being sent to us by old customers!

## Some of the FAMOUS DEPARTMENT STORES that Sell WYPE

### VISIT or PHONE THE STORE IN YOUR CITY...

If you live in one of the cities shown here, it will be more convenient to buy from your favorite department store. Ask your dealer! Leading merchants everywhere sell WYPE.

Akron: M. O'Neil Co.  
Baltimore: May Co.  
Boston: Jordan Marsh Co.  
Buffalo, N. Y.: J. N. Adam & Co.  
Chicago: Goldblatt's 15 Dept. Stores  
(Goldblatt's, also, at Joliet, Ill.;  
Hammond, Gary & South Bend, Ind.)  
Cincinnati: Fair Store Co.  
Cleveland: May Co.  
Dallas: Sanger Bros., Inc.  
Denver: May Co.  
Detroit: People's Outfitting Co.  
Ft. Worth: W. C. Stripling Co.  
Grand Rapids, Mich.: Herpolzheimer Co.

Hackensack, N. J.: Packard-Bamberger Co.  
Houston: Foley's  
Indianapolis: Wm. H. Block Co.  
Kansas City, Mo.: Jones Store Co.  
Los Angeles: May Co.  
Louisville: Kaufman-Straus Co.  
Memphis: B. Lowenstein & Bros.  
Milwaukee: Ed. Schuster & Co., Inc.  
Minneapolis: Donaldson's  
Montgomery: Montgomery Fair Store  
New Orleans: Maison Blanche Co.  
Newark, N. J.: Bamberger's  
New York: Gimbel's

Philadelphia: Lit Brothers  
Pittsburgh: Kaufmann's  
Providence, R. I.: The Shepard Co.  
Richmond, Va.: Miller & Rhoads, Inc.  
Rochester, N. Y.: Sibley, Lindsay & Curr  
St. Louis: Famous-Barr Co.  
St. Paul, Minn.: The Golden Rule  
San Antonio: Joske's of Texas  
San Diego: Whitney's  
Syracuse, N. Y.: Dey Bros. & Co.  
Toledo: Lion Dry Goods Co.  
Washington, D. C.: Lansburgh & Bro.  
Youngstown, O.: Strouse-Hirschberg Co.

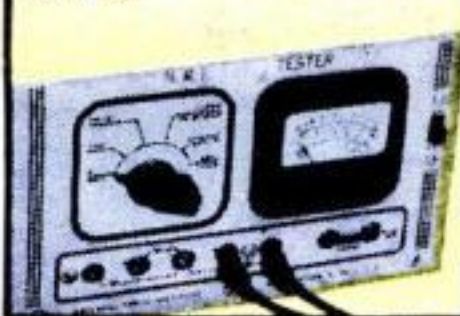
**WYPE CORP. Dept. 17-G 2214 DOLMAN ST. ST. LOUIS 4, MO.**



**YOU BUILD THIS** Radio Circuit early in Course with Soldering Equipment and Radio Parts I send; practice mounting, connecting, soldering Radio parts.



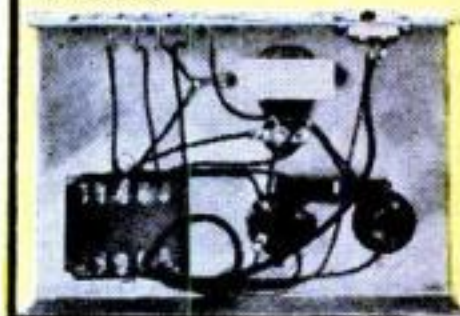
**YOU PRACTICE** Radio Servicing with this Tester built from parts I send. Also use it to help earn EXTRA MONEY fixing neighbors' Radios.



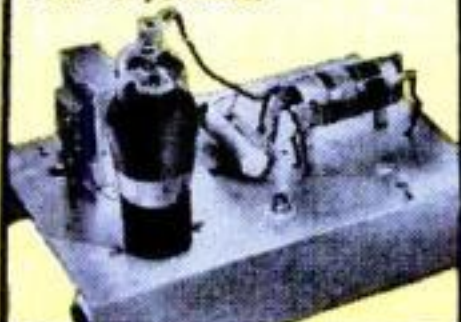
**YOU PRACTICE "FM"** Servicing on this Frequency Modulation (FM) Signal Generator, built with parts I supply; learn by repairing circuit defects.



**YOU BUILD THIS** Vacuum Tube Power Pack, make changes which give you experience, learn how to locate and correct power pack troubles.



**YOU BUILD THIS** A. M. Signal Generator which provides amplitude-modulated signals for many tests and experiments, gives you practical experience.

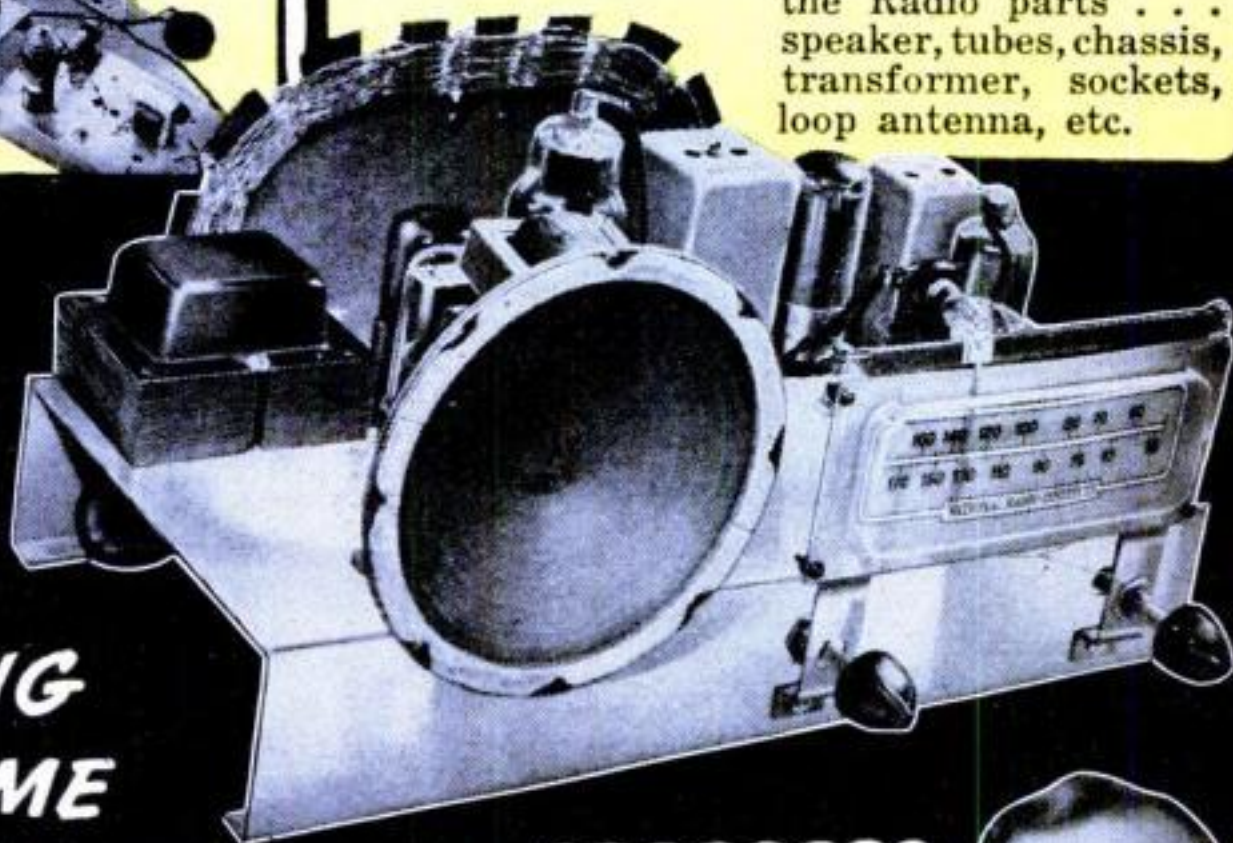


**YOU PRACTICE** signal tracing on this complete Superheterodyne Circuit you build with parts I send you, use it to conduct many tests and experiments.



## You Get PRACTICAL EXPERIENCE With This Superheterodyne Receiver

**YOU BUILD THIS** complete, powerful Radio Receiver that brings in local and distant stations. N. R. I. gives you ALL the Radio parts . . . speaker, tubes, chassis, transformer, sockets, loop antenna, etc.



# LEARN RADIO

**BY PRACTICING IN SPARE TIME**

**WITH BIG KITS OF PARTS I SEND YOU**

Do you want a good-pay job in the fast-growing Radio Industry—or your own Radio Shop? Mail the Coupon for a Sample Lesson and my 64-page book, "How to Be a Success in RADIO—Television, Electronics," both FREE. See how I will train you at home—how you get practical Radio experience building, testing Radio circuits with BIG KITS OF PARTS I send!

Many Beginners Soon Make Extra Money in Spare Time While Learning

The day you enroll I start sending EXTRA MONEY manuals that show how to make EXTRA money fixing neighbors' Radios in spare time while still learning! Now's the time to get

into Radio Repair. Trained Radio Technicians also find profitable opportunities in Police, Aviation, Marine Radio, Broadcasting, Radio Manufacturing, Public Address work. Think of even GREATER opportunities as demand for Television, FM and Electronic devices grows.

Find Out What NRI Can Do For You Mail Coupon for Sample Lesson and my FREE 64-page book. Read the details about the Course, letters from men I trained; see how quickly, easily you can get started. No obligation! MAIL COUPON NOW. J. E. SMITH, President Dept. 8GP3, National Radio Institute, Pioneer Home Study Radio School, Washington 9, D. C.

**I WILL TRAIN YOU AT HOME**

**MY COURSE INCLUDES FREQUENCY MODULATION, TELEVISION, ELECTRONICS**



## I TRAINED THESE MEN

### Has Own Radio Service

"I have my own Radio and Television sales and servicing business. I get enough repair jobs to keep me going right along."—ALEXANDER KISH, 34 Pershing Avenue, Carteret, N. J.

### Good Spare Time Business

"I have been getting receivers to repair right along, and with NRI methods I don't have to spend much time on them."—S. N. STRICKLAND, 191 Dale Homes, Portsmouth, Va.

**GET BOTH 64 PAGE BOOK SAMPLE LESSON FREE**

MR. J. E. SMITH, President, Dept. 8GP3 NATIONAL RADIO INSTITUTE, Washington 9, D. C. Mail me FREE Sample Lesson and 64-page book about how to win success in Radio and Television—Electronics. (No salesman will call. Please write plainly.)

Name..... Age.....

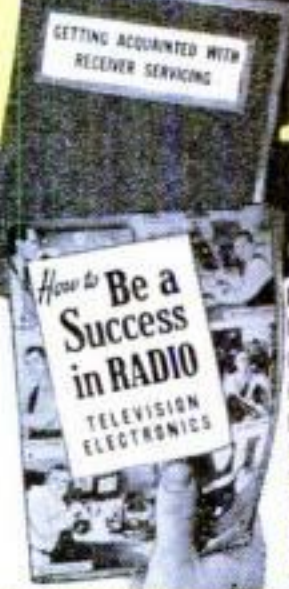
Address.....

City.....Zone.....State.....

☐ Check if Veteran

# VETERANS

You get this training in your own home under G. I. Bill. Mail Coupon.



APPROVED FOR TRAINING UNDER GI BILL



## ELECTRONIC KITS

For HOBBYISTS and EXPERIMENTERS

### HEATHKIT 3-TUBE ALL-WAVE RADIO

110-volt AC operation



**\$8.75**

An ideal way to learn radio. This kit is complete ready to assemble, with tubes and all other parts. Operates from AC. Simple, clear detailed instructions make this a good radio training course. Covers regular broadcasts and short wave bands. Plug-in coils. Regenerative circuit. Operates loud speaker. Battery model for use where no AC house current is available. Add postage for 3 lbs.

Heathkit Beginners' Radio 110-volt type.....	\$8.75
Heathkit Beginners' Radio, battery type (2 tubes, no rectifiers).....	\$8.75
Headphones for either type HS 30 per set.....	\$1.00
2 1/2" permanent magnet loudspeaker for either type.....	\$1.95
Batteries, complete kit for battery type set.....	\$3.25

### MIDGET TRANSMITTER KIT

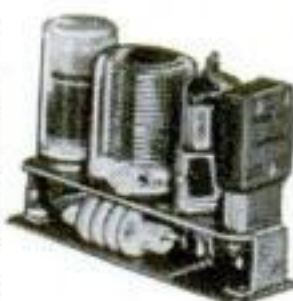
Complete kit to assemble a 1 Watt battery operated amateur 80 meter transmitter, including tube and crystal. Range up to 500 miles. Only accessories needed are sending key and batteries. Complete instructions supplied. Add postage for 2 lbs.

Key—add postage for 2 lbs.....\$1.00

Batteries—add postage

for 4 lbs. ....\$3.25

**\$3.95**



### INTERPHONE 2-WAY CALL SYSTEM KIT



Shipping Wt. 5 lbs.

**\$14.50**

Ideal call and communication system for homes, offices, factories, stores, etc. Makes excellent electronic baby watcher, easy to assemble with every part supplied including simple instructions. Distance up to 1/5 mile. Operates from 110-V A.C. 3 tubes, one master and one remote speaker.

### GENERAL ELECTRIC TRANSMITTER-RECEIVER FOUNDATION

A beautifully constructed tuner containing the best in variable condensers, coils, vernier dials, etc., at least \$30.00 worth of parts, complete with conversion instructions to transmitter and receiver. Add postage for 20 lbs. ....

**\$2.49**



### G. E. CIRCUIT BREAKER

**\$2.95**

Protect your electrical equipment, eliminate fuses. 50 AMP 220 Volt rating. Add postage for 4 lbs.

### MINIATURE MOTOR

24 V.D.C. size 1 1/4" x 1" x 2" Add postage for 1 lb.

**\$2.95**



**ORDER DIRECT  
FROM THIS AD**  
Include postage  
for weight shown.  
Print name and  
address.  
No orders under  
\$2.00

**HEATH CO. DEPT. 5**  
**BENTON HARBOR, MICH.**

# WALKIE- TALKIES!

## Radio Telephone Sends And Receives Several Miles



This is the light weight battery-operated radio that was used so successfully by the Army. One knob tunes both transmitter and receiver. Sends and receives merely by pushing a button. Recommended for amateurs, explorers, police and Government services, etc. Shipped ready to operate, complete with tubes, telephone handset, telescoping antenna, and new batteries. Rebuilt by the Government and guaranteed. Price only \$45.00 each or \$90.00 per pair F. O. B. Chicago.

Extra Batteries (80 hours continuous service) \$4.75 each.

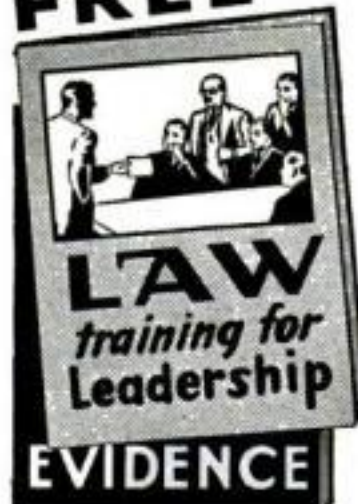
## Parts and Accessories for Walkie Talkies

We maintain complete stocks of replacement parts, batteries, antennas, chassis, etc., for Army Walkie Talkies and Handie Talkies. Write for Special Listing No. 20.



320 N. La Salle St., Dept. WT  
Chicago 10, Illinois

**FREE**



**TO the MAN  
INTERESTED IN  
LAW**

Every question about Law and its value to you is answered in LaSalle's 48-page booklet, "Law Training for Leadership." And the question of how you can master Law is answered in the companion booklet, "Evidence"—in which

scores of our students tell how they have advanced through LaSalle Law Training in spare hours at home.

Legal training gives you what the business and professional world prizes highly and rewards liberally—a keen, analytical mind, the ability to judge shrewdly, talk convincingly, and act with confidence.

LaSalle's "Problem Method" of personalized instruction by lawyer-instructors gives you practice in handling legal problems... you learn by doing, not by memorizing rules. We guide you step-by-step, furnish all texts, including remarkable 14-volume Law Library prepared by leading law professors and lawyers, and used as reference in many Law libraries and offices. Degree of LL.B. conferred. Low cost, easy terms.

Investigate your opportunities in Law. Mail coupon today for free booklets described—without obligation.

### LA SALLE EXTENSION UNIVERSITY A Correspondence Institution

417 S. Dearborn St. Dept. 783-L Chicago 5, Ill.

Send me "Law Training for Leadership" and "Evidence"—without obligation.

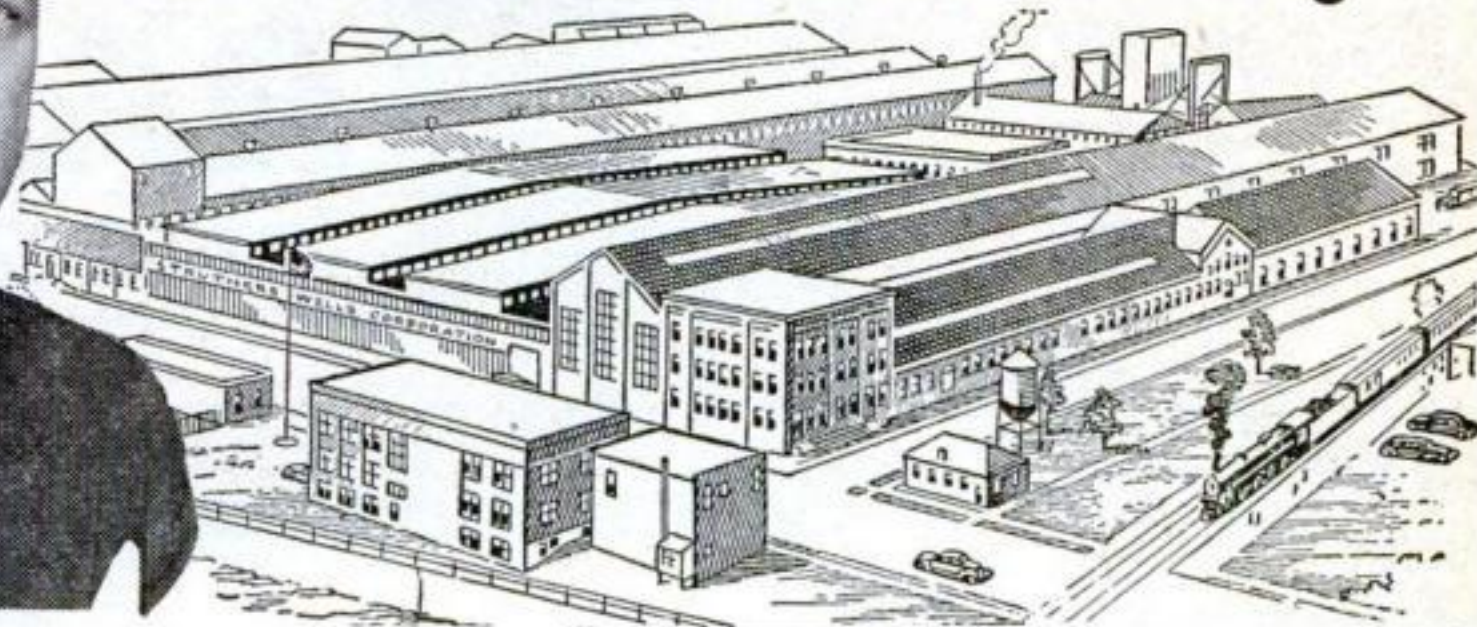
Name.....Age.....  
Street.....  
City, Zone & State.....



**"Many of our key men owe  
their success to I.C.S. training"**



**C. W. JENSEN, General Superintendent  
Struthers Wells Corp.  
Warren, Pa.**



**The** Struthers Wells Corporation makes custom-built industrial equipment—specializes in precision and accuracy. The skill and training of the Struthers Wells engineers, designers, craftsmen are reflected in the quality of the work they turn out. It's significant that a high percentage of these men received their training through International Correspondence Schools. Their records of success prove the worth of this sound, practical training.

The same opportunity is open to you. If you have ambition, foresight, normal intelligence—I.C.S. can help you get ahead. The first step is to mail the coupon below. Do it now!

“ We have five engineering departments and the heads of four of them are I.C.S. men.

“ I.C.S. has trained 33 per cent of our engineers and draftsmen.

“ 85 per cent of our shop supervisors have studied I.C.S. courses.

“ 12 per cent of all employees in this plant are I.C.S. students or graduates.”

## INTERNATIONAL CORRESPONDENCE SCHOOLS



**BOX 7610-M, SCRANTON 9, PENNA.**

Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

### Air Conditioning and Plumbing Courses

- ☐ Air Conditioning ☐ Plumbing  
☐ Heating ☐ Steam Fitting  
☐ Refrigeration

### Chemistry Courses

- ☐ Chemical Engineering  
☐ Chemistry, Analytical  
☐ Chemistry, Industrial  
☐ Chemistry, Mfg. Iron & Steel  
☐ Petroleum Refining ☐ Plastics  
☐ Pulp and Paper Making

### Civil Engineering, Architectural and Mining Courses

- ☐ Architecture  
☐ Architectural Drafting  
☐ Bridge and Building Foreman  
☐ Building Estimating  
☐ Civil Engineering  
☐ Coal Mining  
☐ Contracting and Building  
☐ Highway Engineering  
☐ Lumber Dealer  
☐ Reading Structural Blueprints  
☐ Sanitary Engineering  
☐ Structural Drafting

- ☐ Structural Engineering  
☐ Surveying and Mapping  
☐ Communications Courses

- ☐ Electronics  
☐ Practical Telephony  
☐ Radio, General  
☐ Radio Operating  
☐ Radio Servicing  
☐ Telegraph Engineering

### Electrical Courses

- ☐ Electrical Drafting  
☐ Electrical Engineering  
☐ Electric Light and Power  
☐ Lighting Technician  
☐ Practical Electrician

### Internal Combustion Engines Courses

- ☐ Auto Technician ☐ Aviation  
☐ Diesel-Electric  
☐ Diesel Engines ☐ Gas Engines

### Mechanical Courses

- ☐ Aeronautical Engineer's, Jr.  
☐ Aircraft Drafting  
☐ Flight Engineer  
☐ Forging ☐ Foundry Work  
☐ Heat Treatment of Metals

- ☐ Industrial Engineering  
☐ Industrial Metallurgy  
☐ Machine Shop  
☐ Mechanical Drafting  
☐ Mechanical Engineering  
☐ Mold-Loft Work  
☐ Patternmaking—Wood, Metal  
☐ Reading Shop Blueprints  
☐ Sheet-Metal Drafting  
☐ Sheet-Metal Worker  
☐ Ship Drafting ☐ Ship Fitting  
☐ Tool Designing  
☐ Toolmaking  
☐ Welding—Gas and Electric

### Railroad Courses

- ☐ Air Brake ☐ Car Inspector  
☐ Diesel Locomotive  
☐ Locomotive Engineer  
☐ Locomotive Fireman  
☐ Railroad Section Foreman

### Steam Engineering Courses

- ☐ Boilermaking  
☐ Combustion Engineering  
☐ Engine Running  
☐ Marine Engineering  
☐ Steam Electric ☐ Steam Engines

### Textile Courses

- ☐ Cotton Manufacturing  
☐ Rayon Weaving  
☐ Textile Designing  
☐ Woolen Manufacturing

### Business and Academic Courses

- ☐ Accounting ☐ Advertising  
☐ Arithmetic ☐ Bookkeeping  
☐ Business Administration  
☐ Business Correspondence  
☐ Certified Public Accounting  
☐ Commercial  
☐ Commercial Art  
☐ Cost Accounting  
☐ Federal Tax  
☐ First Year College  
☐ Foremanship ☐ French  
☐ Good English ☐ High School  
☐ Higher Mathematics ☐ Postal Service  
☐ Motor Traffic ☐ Secretarial  
☐ Salesmanship  
☐ Sign Lettering  
☐ Spanish ☐ Stenography  
☐ Traffic Management

Name \_\_\_\_\_ Home Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Age \_\_\_\_\_ Present Position \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to \_\_\_\_\_ P.M.

Special tuition rates to members of the Armed Forces. Special discount to World War II Veterans.  
Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.



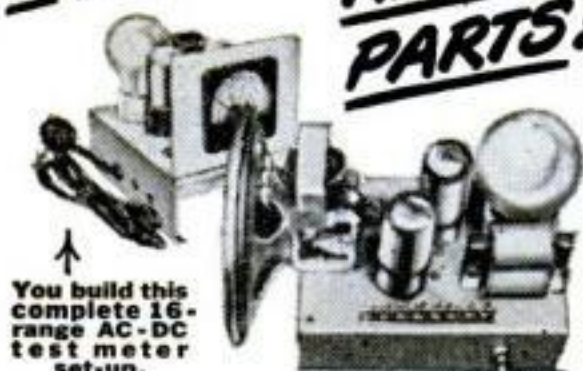
**HERE'S  
THE  
Complete  
Sprayberry  
Course!**

# LEARN RADIO

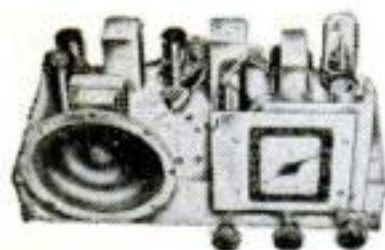
**ELECTRONICS-  
TELEVISION!**



**I SEND YOU  
8 BIG KITS OF  
RADIO  
PARTS!**



↑  
You build this  
complete 16-  
range AC-DC  
test meter  
set-up.



↑  
I show you how  
to build this  
speaker tester  
and many other  
instruments.

←  
You build, test &  
troubleshoot  
this powerful 6-  
tube super-  
het Radio.

## I'LL TRAIN YOU AT HOME—BETTER—FASTER by Putting You to Work with Your Hands

In this picture I show you exactly what you'll get from me during your Sprayberry Radio Training. This actual photograph speaks for itself! Sprayberry Radio Training is **really COMPLETE**—I start you with interesting, easily understood basic knowledge and I keep the mailman busy bringing you valuable Service Manuals, profitable Business Builders, extra helps and books—and **8 Big Kits of Actual Radio Equipment!** My course is practical and down-to-earth. You get my personal help every step of the way. My method is **BEST** for you—because you train largely by working with your hands—building, testing, trouble-shooting with parts I supply. With these kits you build a powerful 6 tube superhet Radio, a big 16 range test meter and perform over 175 other fascinating practical experiments.

### EARN WHILE LEARNING

Shortly after you enroll I send you my famous **BUSINESS BUILDERS** that help you get and do profitable neighborhood Radio Service jobs while learning. These jobs pay well, and pave the way for a Service Business of your own.

All branches of Radio, Television and Electronics are booming! Trained men are needed **NOW!** I'll prepare you for your own profitable Radio Service Business or a big pay radio job in double quick time. You learn at home in spare time—you keep your present job and income while getting set for the future.

My course is so perfectly planned—so easy to grasp and understand—you need no previous knowledge or experience in Radio or Electricity. Get the facts now—find out what Sprayberry Radio Training can do for you. Mail the coupon below and by return mail I'll rush my big book, "How To Make Money In Radio, Electronics and Television" that tells all about Sprayberry Training. I'll also send you a Sample Lesson, "How To Read Radio Diagrams and Symbols"—all **FREE**. You'll read many letters from successful Radio men I've trained.

## LOW COST Complete TRAINING

Sprayberry Training is surprisingly Low in Cost—and if you desire, convenient monthly payments can be arranged. This is **COMPLETE, UP-TO-DATE** training—covering Radio Repairing, Television and F. M., Industrial Electronics and many other new developments. Sprayberry Trained men really know Radio. This is training that sticks with you and makes money for you.

**Mail COUPON Today!**

FRANK L. SPRAYBERRY, President  
**SPRAYBERRY ACADEMY OF RADIO,**  
5578 Sprayberry Building, Pueblo, Colorado  
Rush my **FREE** copies of "How To Make Money In Radio, Electronics and Television" and "How To Read Radio Diagrams and Symbols." (No salesman will call.)

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_ AGE \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

☐ Check here if a Veteran.

## FREE SAMPLE LESSON and Big Catalog

See how quickly and easily you can get your start in Radio, Electronics, Television with Sprayberry Training. Just fill out, clip and mail the coupon **NOW** for my big **FREE** book and **FREE** Sample Lesson. No obligation. No salesman will call. Read all the facts about Sprayberry Training—then decide. Take the first step **TODAY**—rush the coupon to me.

**VETERANS:** Approved for G. I. Training under Public Laws 16 and 346. Check coupon and mail today for complete facts.

**SPRAYBERRY ACADEMY OF RADIO**

FRANK L. SPRAYBERRY, President

Room 5578, SPRAYBERRY BUILDING, PUEBLO, COLORADO





# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

## CLARENCE A. O'BRIEN & HARVEY JACOBSON

*Registered Patent Attorneys*

82-G DISTRICT NATIONAL BUILDING • WASHINGTON 5, D. C.

**Patents**

**Trademarks**

**Copyrights**

CLARENCE A. O'BRIEN & HARVEY JACOBSON  
Registered Patent Attorneys

82-G District National Bldg., Washington 5, D. C.

Please send me copy of "Patent Guide for the Inventor" and also "Record of Invention" form. This request does not obligate me.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

(Please write or print plainly.)



ACE Hollywood Experts  
WILL TRAIN YOU AT HOME...  
NOW YOU CAN MAKE GOOD IN

# RADIO

TELEVISION  
ELECTRONICS

Through Practical  
Experiments With

# 10

BIG KITS  
R.T.A.  
Gives you!

You Do  
Scores of  
Practical  
Experiments

Illustrated above are only a few of the many job-exercises you do, through RTA's "shop-type" home training method. You build a TRF Receiver, a High-Frequency Converter, a 6-tube AC-DC Superhet Receiver, plus dozens of other interesting jobs.

These jobs give you actual SHOP EXPERIENCE necessary to your success.

FILL OUT  
COUPON  
AND MAIL  
TODAY!



YOU WORK  
ON REAL  
EQUIPMENT

## Opportunities Wide Open

400 MILLION new radio and television sets will be built within ten years. 72 MILLION dollars are being spent RIGHT NOW for radio repairs alone! When you are trained by RTA's Hollywood Experts, you too can qualify for big, interesting GOOD-PAYING technicians jobs, or YOUR OWN profitable radio-television repair business.

## Extra Cash in Spare Time

RTA's Hollywood Experts show you how to earn welcome EXTRA CASH, while you learn. In fact, like many RTA students, you may actually get MORE spare time work than you can handle.

## 25 Years of Success

RTA's long years of experience assure you quickest progress. If you are at all mechanically inclined, RTA can teach YOU to MAKE GOOD in Radio-Television.

SO GET THE FACTS!  
SEND FOR FREE  
30-PAGE BOOK  
TODAY!



RADIO TRAINING ASSOC. OF AMERICA, DEPT. PSG  
5620 Hollywood Blvd., Hollywood 28, Calif.

Send FREE BOOK showing how to make good in Radio-Television through training by Hollywood experts.

NAME \_\_\_\_\_ AGE \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

## Letters



### Flying Saucers?

Sir:

After reading "Are Secret Balloons Flying Saucers?" in Popular Science of May, 1948, I have decided it was the work of a moron or a liar. . . .

I have seen flying discs five times. I have taken and obtained two photographs of discs. . . . Do balloons travel against the wind at 10,000 to 14,000 feet? Do balloons travel in formation like birds? Do balloons have holes in the center? . . .

I am surprised that a science magazine such as yours would publish such nonsense . . .

CHARLES W. SHANGLE, JR.

Boise, Idaho

Sir:

. . . I saw them, too, and they weren't balloons. Also, I wasn't seeing spots in front of my eyes. Some of the "flying saucers" might accidentally have turned out to be balloons, but not all of them. Officialdumb can sure think up some goofy reasons for things they don't understand. . . .

The ones I saw were flying in perfect formation . . . it was late at night. There was no searchlight that could be seen closer than at Chattanooga. All others were blocked off by the mountains. And yet they gave off an extremely bright glow which nearly lit up the landscape like day. . . .

MRS. FELIX G. MATTHEWS

Columbia, S. C.

Sir:

. . . I think that your story about the balloons is one of the best explanations, but here is mine.

Last summer in Port Huron, Michigan, they had a celebration of their "Blue Water Festival." . . . While still in town we passed a large searchlight. After leaving town we could still see the beam. . . . When reaching camp we could no longer see the beam but saw the patch of light it made on low clouds. To us it seemed a very convincing "flying saucer"—if we hadn't known better. . . .

RONALD KORSAK

Oceanside, Calif.

Sir:

. . . I doubt if the reporter who wrote the



# INVENTORS

Patent laws encourage the development of inventions.

We recommend that an inventor employ a registered Patent Attorney or agent, if the inventor is not familiar with patent matters. This is because the value of a patent depends largely upon the skillful preparation of the specification and claims in the patent application.

The firm of McMorrow, Berman and Davidson is registered to practice before the United States Patent Office. Additionally it engages patent attorneys able to readily understand inventors' disclosures, to advise concerning patentability, and to prepare appropriate specifications and claims.

If an inventor believes he has an invention, a search of the most pertinent prior U. S. patents should be made and a report obtained relative to its patentability. Where such report indicates that the invention appears patentable, in order to secure protection, diligence should be exercised in making application for a patent.

Send for a copy of Patent Booklet entitled "How To Protect Your Invention." This booklet contains information on patent protection and procedure. You will also receive an "Invention Record" blank. This will be promptly forwarded to you upon request—no obligation.

## McMORROW, BERMAN & DAVIDSON

*Registered Patent Attorneys*

PATENTS • TRADE MARKS • COPYRIGHTS

142-K VICTOR BUILDING, WASHINGTON 1, D. C.

### McMORROW, BERMAN & DAVIDSON

*Registered Patent Attorneys*

142-K Victor Building, Washington 1, D. C.

Send me your Patent Booklet, "How To Protect Your Invention", and also "Invention Record" form at once. I understand this request does not obligate me.

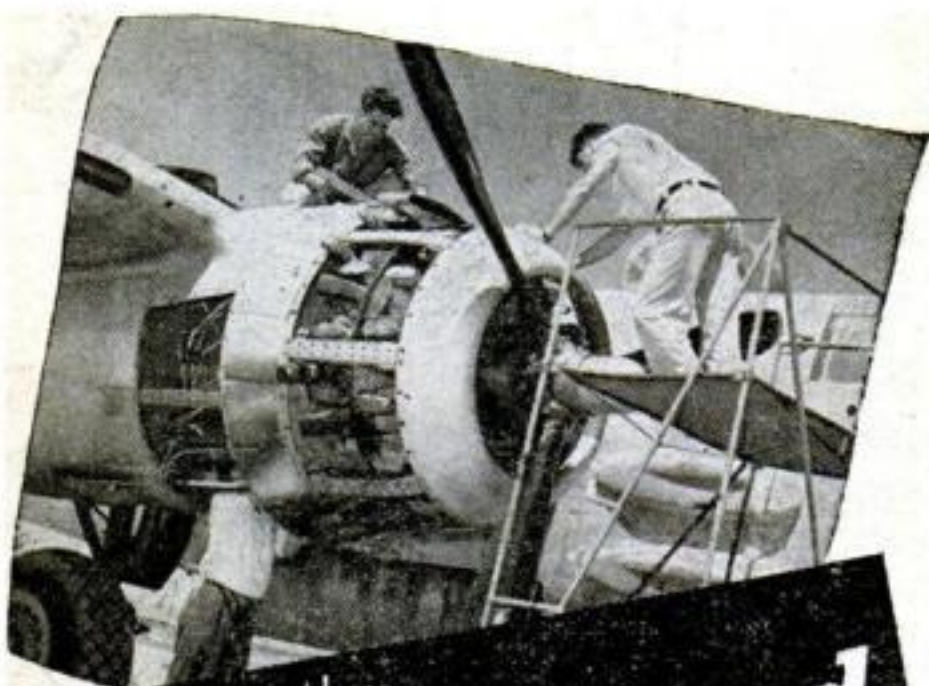
Name.....

Address.....

City.....

(WRITE OR PRINT NAME CLEARLY)





*well*  
**Be prepared**  
for what's ahead!

## ... Get **NORTHROP** Aircraft & Engine Mechanics Training

**NOW** is the time to start getting prepared for the future. The trained man has all the advantages. The certificated Aircraft and Engine Mechanic is a key man in *all* branches of Aviation. Get your A & E training — be ready for important duties, top pay, leadership, and a lifelong career with security and success.

Come to Northrop and get the many advantages of A & E Mechanic training in the midst of important, large-scale aviation activities — training with direct aviation "know-how" — training based on Northrop's long experience as a major employer of thousands of engineers, technicians, and mechanics. You get actual experience on all types of aircraft — from single-seaters and helicopters to multi-engine military planes.

**Train on NORTHROP FIELD** in a technical institute that is part of a famous aircraft company. Northrop graduates are in demand. Send coupon for complete information on 50-weeks A & E course — approved by Civil Aeronautics Administration. Classes start every four weeks.



APPROVED FOR VETERANS

## **NORTHROP** Aeronautical Institute



Division of Northrop Aircraft, Inc.  
James L. McKinley, Managing Director  
1525 E. Broadway, Hawthorne, Los Angeles County, Calif.

Please send me the Institute catalog and complete information, including starting dates of classes. I am interested in

- ☐ Aircraft and Engine Mechanics (A & E)  
☐ Aeronautical Engineering

Name \_\_\_\_\_

Address \_\_\_\_\_

Age \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_

Check one: ☐ Veteran ☐ In Service ☐ Civilian

article observed many of the research balloons in flight. I have. I was formerly with the United States Weather Bureau and watched a good many of them. . . .

There is one outstanding characteristic about them that instantly becomes obvious to an observer who has one pointed out to him in flight. That is its apparent motionless. . . . I have frequently seen them mistaken for stars or fixed bodies. . . .

The one feature which was in common about most eyewitness descriptions of the "flying saucers" was speed. . . . That rules out the weather balloons without question because they just don't look that way. . . . I'm afraid your reporter will have to try again.

PHILIP A. HASTINGS

Smithfield, Utah

*PS will accept the flying saucers as scientific fact when a captive saucer is produced. To date, captive "saucers" include a factory gear wheel that let loose and landed in a back yard, and a standard weather balloon.*

## **New Isotope Chart**

Sir:

Would you kindly advise me where I can obtain a copy or information of the new isotope chart of the elements which was partly shown in the March 1948 issue of POPULAR SCIENCE ["U. S. Alchemists Make Gold," p. 161]. I am a chemistry student and would like to obtain one for my class.

JACK STORY

Parkertown, N. J.

*The complete chart has been made available by the Addison-Wesley Press, Inc., Kendall Square Building, Cambridge 42, Mass., at 50 cents for a folded reference copy and \$1.25 for a larger, wall-size copy.*

## **Rocket Brakes for Rockets**

Sir:

In regard to your article "Rocket Locomotive Hits 1,000 M.P.H.," page 120, March, 1948, why not stop 'em like they start 'em?

Three or four rockets headed the other way and set off just before the vehicle reaches the end of the run should do it.

J. W. SHARPE

Columbus, Ohio

*A good idea, but unfortunately it doesn't work. Since the 1,000-m.p.h. rocket makes*



# P A T E N T S

Unless an inventor is thoroughly familiar with such matters, he is advised to employ a competent registered patent attorney or agent as the value of patents depends largely upon the skillful preparation of the specification and claims.

**For his guidance, the following are the usual preliminary steps which the inventor takes toward patent protection.**

**The "Evidence of Invention" form mentioned below is offered as a convenience to the inventor in making his disclosure of invention.**

The inventor should date and sign his disclosure and have it witnessed by two or more persons who are capable of understanding his invention. The disclosure should then be mailed to the registered patent attorney or agent whom he

selects to assist him. The disclosure should be accompanied by a letter authorizing the patent attorney or agent to conduct a preliminary search among previously granted U. S. patents for similar types of invention. The patent attorney or agent then prepares a report of the probable patentability of the invention and recommends the further course the inventor should take, provided the report indicates possible patentability.

**This firm is registered to practice before the U. S. Patent Office and is available to assist inventors in the preparation and prosecution of their cases. The coupon below is suggested as a convenience to the inventor in starting action on his invention.**

**VICTOR J. EVANS & Co.** *Merlin M. Evans*  
REGISTERED PATENT ATTORNEY  
340-G MERLIN BUILDING, WASHINGTON 6, D. C.

*Please send me without obligation a copy of your booklet "Patent Protection For Inventors" together with your convenient "Evidence of Invention" form.*

Name.....

Address.....

City and State.....

PATENTS      TRADEMARKS      COPYRIGHTS



# AUDELS Carpenters and Builders Guides

4 vols. \$6



**Inside Trade Information** for Carpenters, Builders, Joiners, Building Mechanics and all Woodworkers. These Guides give you the short-cut instructions that you want—including new methods, ideas, solutions, plans, systems and money saving suggestions. An easy progressive course for the apprentice and student. A practical daily helper and Quick Reference for the master worker. Carpenters everywhere are using these Guides as a Helping Hand to Easier Work, Better Work and Better Pay. To get this assistance for yourself, simply fill in and mail **FREE COUPON** below.

## Inside Trade Information On:

How to use the steel square—How to file and set saws—How to build furniture—How to use a mitre box—How to use the chalk line—How to use rules and scales—How to make joints—Carpenters arithmetic—Solving mensuration problems—Estimating strength of timbers—How to set girders and sills—How to frame houses and roofs—How to estimate costs—How to build houses, barns, garages, bungalows, etc.—How to read and draw plans—Drawing up specifications—How to excavate—How to use settings 12, 13 and 17 on the steel square—How to build hoists and scaffolds—skylights—How to build stairs—How to put on interior trim—How to hang doors—How to lath—lay floors—How to paint.



**AUDEL, Publishers, 49 W. 23rd St., New York 10, N. Y.** Mail Audels Carpenters and Builders Guides, 4 vols., on 7 days' free trial. If OK I will remit \$1 in 7 days and \$1 monthly until \$6 is paid. Otherwise I will return them. No obligation unless I am satisfied.

Name \_\_\_\_\_

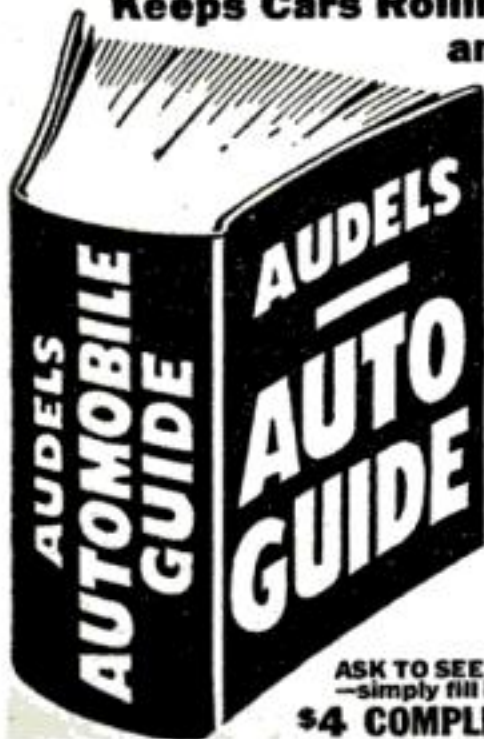
Address \_\_\_\_\_

Occupation \_\_\_\_\_

Employed by \_\_\_\_\_ P.S.M.

# PRACTICAL AUTO INFORMATION

**Keeps Cars Rolling by Making Repairs and Adjustments Easy!**



**AUDELS AUTO GUIDE** For Every Mechanic, Driver, Owner and Repair Shop.

**Sent on 7 Days Approval** Shows How to Tune Up—Keep Brakes Safe—Batteries Powerful—Tire Mileage Up—Save Gas—Lubricate Correctly.

**ANSWERS YOUR QUESTIONS** Contains all you need to know about 1—Construction, 2—Operation, 3—Service, 4—Repair of Modern Motor Cars, Trucks, Buses & Diesel Engines in every detail.

**NEW FLUID DRIVE TREATED** Easy to understand—1540 Pages, 1540 Illustrations. Gives definite directions on How to handle service jobs.

ASK TO SEE IT—Get this information for yourself—simply fill in and mail coupon today.

**\$4 COMPLETE • PAY ONLY \$1 A MO.**

**AUDEL, Publishers, 49 West 23rd St., New York** Mail AUDELS AUTOMOBILE GUIDE (\$4) for free examination. If O.K., I will send you \$1 in 7 days; then remit \$1 monthly until \$4 is paid. Otherwise, I will return book promptly.

Name \_\_\_\_\_

Address \_\_\_\_\_

Occupation \_\_\_\_\_

Employed By \_\_\_\_\_ P.S.M.

the entire 2,000-foot run in two seconds, there simply isn't time to get counter rockets into operation. On slow-speed runs of about 500 m.p.h., however, a counter rocket was actually used. On a proposed 10,000-foot track, it may be possible to employ counter rockets at the higher speeds. If rockets are not feasible, water brakes may be used.

## Superhet Headache

Sir:

In April and May issues, please note a slight mistake in schematic diagram of "A Superhet the Beginner Can Build." A connection drawn from the second IF transformer [AVC terminal] to the first audio tube [pin 2 of the 12SQ7]. . . .

JOHN J. BALK

Phila., Pa.

Sir:

. . . I built the set as directed and the tubes light and the check voltages are as listed, but the only station I can receive is a local on 1450 kc.

J. R. RAWLS

Suffolk, Va.

Mr. Balk is right, which probably accounts for the trouble Mr. Rawls and other readers have noticed. The connection from the AVC terminal of IF2 to R6 and C6 is wrong and should be removed from the circuit. It will produce a marked loss in volume, possible oscillation, and instability. The pictorial diagram at the bottom of page 225, April, is correct in this respect.

## Giving Credit Where Due

Sir:

In reading your article in the May issue of PS ["Leapfrog Barge Swims, Walks, Climbs," p. 146] about the "Navy's newest amphibious vehicle," well it just isn't anything new.

I was a member of the Sea Bee outfit known as A.B.C.D. on the island of Oahu T. H., and we, too, made a leapfrog barge. We didn't get the drawings etc. to build it until too late to help in the war. . . .

I must admit the barge in PS is just a little fancier in design, but you have to consider that the gear raceways were bent by hand in our blacksmith shop under Chief Walter Plaskett, and the gears themselves were cast in a foundry we also built.

Plenty of nights a crew worked voluntarily under a Hawaiian moon and welding arcs to



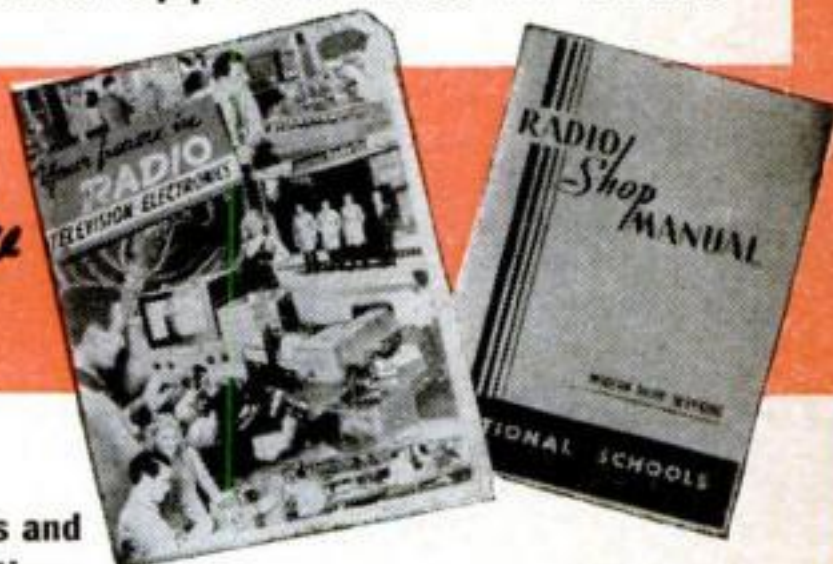


You receive all parts, including tubes, for building this fine, modern Superheterodyne Receiver. This and other valuable standard equipment becomes your property.

# Learn RADIO TELEVISION, ELECTRONICS *by* SHOP METHOD HOME TRAINING

Let NATIONAL SCHOOLS, of Los Angeles, a practical Technical Resident Trade School for almost 50 years, train you for today's unlimited opportunities in Radio

*these two* **FREE** *books*  
*will tell you how*

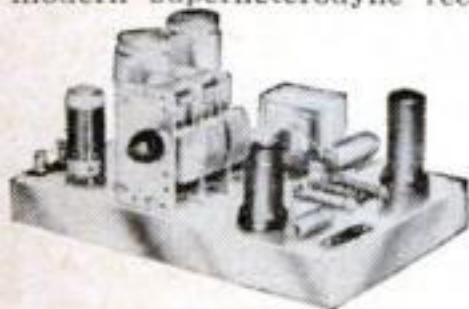


## GOOD JOBS AWAIT THE TRAINED RADIO TECHNICIAN

You are needed in the great, modern Radio, Television and Electronics industry! Trained Radio technicians are in constant and growing demand at excellent pay—in Broadcasting, Communications, Television, Radar, Research Laboratories, Home Radio Service, etc. National Schools Master Shop Method Home Study Course, with newly added lessons and equipment, can train you in your spare time, right in your own home, for these exciting opportunities. Our method has been proved by the remarkable success of National Schools-trained men all over the world.

### You Learn by Building Equipment with Standard Radio Parts We Send You

Your National Schools Course includes not only basic theory, but practical training as well—you learn by doing. We send you complete standard equipment of professional quality for building various experimental and test units. You advance step by step until you are able to build the modern superheterodyne receiver shown above, which is yours to keep and enjoy. You perform more than 100 experiments—build many types of circuits, signal generator, low power radio transmitter, audio oscillator, and other units. The Free Books shown above tell you more about it—send for them today!



## **NOW!** NEW PROFESSIONAL MULTITESTER INCLUDED



This versatile testing instrument is portable and complete with test leads and batteries. Simple to operate, accurate and dependable. You will be able to quickly locate trouble and adjust the most delicate circuits. You can use the Multitester at home or on service calls. It is designed to measure AC and DC volts, current, resistance and decibels. You will be proud to own and use this valuable professional instrument.

### Lessons and Instruction

#### Material Are Up-to-date, Practical, Interesting

National Schools Master Shop Method Home Training gives you basic and advanced instruction in all phases of Radio, Television and Electronics. Each lesson is made easy to understand by numerous illustrations and diagrams. All instruction material has been developed and tested in our own shops and laboratories, under the supervision of our own engineers and instructors. A free sample lesson is yours upon request—use the coupon below.

Here's Just a Few of the Interesting Facts you Learn with the

#### FREE MANUAL

1. Routine for diagnosing Radio Troubles.
2. Preliminary Inspection of Receivers.
3. How to Test and Measure Voltages.
4. How to Test Speaker in Audio Stages.
5. How to Trace the Circuit and Prepare Skeleton Diagram.
6. Complete Reference Table for Quickly Locating Receiver Troubles.

Both Resident and  
Home Study Courses  
Offered

**APPROVED  
FOR  
VETERANS**

Check Coupon

## NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA EST. 1905



### MAIL OPPORTUNITY COUPON FOR QUICK ACTION

National Schools, Dept. PS-7  
4000 South Figueroa Street  
Los Angeles 37, California

(Mail in envelope  
or paste on penny  
postcard.)

Mail me FREE the books mentioned in your ad including a sample lesson of your course. I understand no salesman will call on me.

NAME.....AGE.....

ADDRESS.....

CITY.....ZONE.....STATE.....

☐ Check here if veteran of World War II  
Approved for veterans

GET THE DETAILS—SEND THE COUPON

Copyrighted material



**GROBAN'S SURPLUS BARGAINS!**

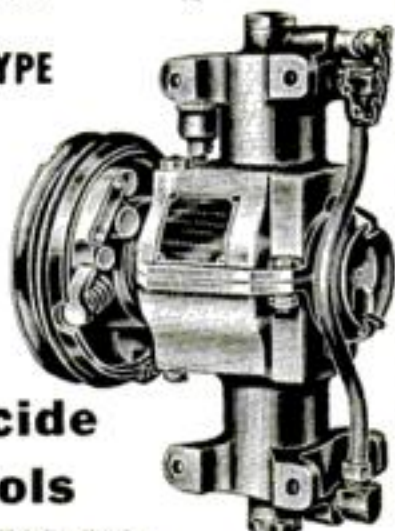
# WESTINGHOUSE AIR COMPRESSOR

**Brand New  
War Surplus Bargain Special!**

**2 CYLINDER PISTON TYPE**

**IDEAL FOR**

- Paint Spraying
- Industrial Uses
- Tire Inflating
- Spraying Insecticide
- Operating Air Tools



**FOR THE HOME... FARM... FACTORY.**  
Designed for automotive truck or tractor mounting. Can be run off fan belt or power takeoff. Comes with automatic clutch. Can be installed for use on: farm trucks, jeeps, tractors, tire or garage service trucks, contractor or road building machinery, pneumatic devices, etc. Can be operated with  $\frac{1}{2}$  H.P. or more electric motor or equivalent portable gas engine.

Light weight, compact and versatile unit... delivers "oil free air"... simple in operation; requires minimum of maintenance; operates under all climatic conditions; suggested operating pressure 75 P.S.I.; equally efficient operation in either direction of rotation; approx. displacement 3.27 CFM at 600 RPM. 6.54 CFM displacement at 1200 RPM; 2" Bore— $1\frac{1}{2}$ " Stroke. Overall dimensions: width 9", height  $11\frac{1}{4}$ ", depth  $6\frac{5}{8}$ "; approx. wt. 23 lbs.

**A REAL BUY... worth many times this price....**

**\$26.95**  
F.O.B. Chicago

Send check or money order today.  
**SATISFACTION GUARANTEED.**

## REGO REGULATORS

Underwriters Approved

### Oxygen—Model 1601

INLET 967

BRAND NEW



**FOR THE WORKSHOP—HOME—FACTORY—FARM.** Designed for precision, gas pressures; meet the heavy demands of cutting and welding in shops, ship and scrap yards, mills, etc. REGO REGULATORS deliver an ample supply of gases at constant, even pressures.

Manufactured by Bastian-Blessing Company. This highly dependable, accurate instrument is modern in design—diaphragms are  $2\frac{3}{4}$ " in diameter; two brass gauges are each  $2\frac{1}{2}$ " in diameter; 0-400 P.S.I. and 0-3000 P.S.I. Ship. wt. 7 lbs.

**ORIGINALLY WORTH MANY TIMES MORE**

**\$12.95**  
F.O.B. Chicago

$\frac{1}{2}$  H.P.—A.C.

## ELECTRIC MOTOR

(Capacitor Type) BRAND NEW  
For the Farm—Home—Factory—Workshop

Here are a Few of Many Uses:

- PUMPS
- STOKERS
- OIL BURNERS
- UNIT HEATERS
- AIR COMPRESSORS
- REFRIGERATION UNITS
- CONVEYORS
- BLOWERS—FANS
- MACHINE TOOLS

$\frac{5}{8}$ " Keyed Shaft; 115-230 Volt; 60 Cycle; 1725 R.P.M. Single Phase—Alternating Current—Capacitor Start—Induction Run—Resilient Mount and Motor Protector—Reversible Rotation—High Starting Torque—Magnetic Starting Switch. Cooler Operation—Dynamic Balance—Compact Design.



**\$34.95**  
F.O.B. Chicago

**GROBAN SUPPLY CO.**

DEPT. P 5-7, 1507 S. MICHIGAN AVE., CHICAGO 5, ILLINOIS

finish the "monster" in time to be of use to the war effort.

I think Lt. Sterling Thompson and all the rest of the officers and men who worked on it should have at least got a mention in small print.

Was our barge ever recognized? Did it play any part in inspiring the one in PS? I guess we'll never know!

CHARLES HARDING, JR.

Saugus, Mass.

*Mr. Harding and his mates were not working in vain. They were performing valuable spadework on the original "walking barge." For security reasons, however, their efforts had to go unsung until now.*

### Slip of the Typewriter

Sir:

... On page 125 [PS, April '48] you pictured the 1948 Cadillac and stated that the model shown was of the Series 50. This seems to be incorrect for no Series 50 is being produced this year. The model pictured is the Fleetwood 60 Special.

FRANK T. NESBITT, JR.

Toledo, Ohio

*PS was 10 too low. The model is a Series 60, as Mr. Nesbitt points out.*

### New Subscriber

Sir:

Please furnish us the material specified below. . . .

One subscription, Popular Science, beginning Jan. 1948 and ending Dec. 1948.

O. H. NOLTE  
Purchasing Agent

The Zia Company  
U. S. Atomic Energy Commission  
Los Alamos, N. Mex.

### How to Take a Pig from a Poke

Sir:

In regard to J. C. Sightler's article, "I tackled a dent" [March, p. 202].

After he inserted the football in the door and re-shaped the door, how did he deflate it to withdraw it?

R. F. CANTONI

Springfield, Ill.

*He used an older type of football having a valveless stem on the bladder, so that disconnecting the pump released the air. Otherwise, this would indeed be a problem.*



# GROBAN'S SURPLUS BARGAINS!

**BRAND NEW**



## AIR OR OIL HYDRAULICS

Use hydraulics on arbor presses, hydraulic presses, hay lifts, manure loaders, lift trucks—push or pull, tilt or turn, press or squeeze, open or close, lift or lower—and other hydraulic and industrial applications. Use with either air or oil of finest precision workmanship.

1. Use these cylinders on farm trucks, bulldozers, hay lifts, manure loaders, etc. Double action. 1 1/2" bore, 27" stroke. (Will lift 1760 lbs. in 2 seconds with Vickers Pump). Wt. 8 lbs. A \$55.00 hydraulic cylinder value for only, **\$12.95 post-paid**
2. Double action, 2 1/2" bore, 8" stroke. (Will lift 4400 lbs. in one second with Vickers Pump). Will withstand 1500 P.S.I. against wall. Wt. 7 lbs. A \$65.00 value. available now at..... **\$14.50 post-paid**
3. Double action, 3" bore, 12" stroke. All steel hydraulic cylinder. will lift up to 12,000 lbs. (7000 lbs. in 3 seconds with Vickers Pump). Wt. 12 lbs. \$78.00 value ..... **\$19.50 post-paid**

## Brand New HYDRAULIC CONTROL VALVES



Outlets are standard 1/2" pipe thread and inlet takes standard 1/4" copper tubing fitting.

1. Four-way control valve for use with double action hydraulic cylinder. may be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Brand new. Ship. wt. 4 lbs. **\$7.95 post-paid**
2. Four-way control valve for use with two hydraulic double action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Brand New. Ship. Wt. 6 lbs. A \$60.00 value..... **\$10.95 post-paid**
3. Same as valve item 2, except that unit is designed for three double action cylinders. Brand New. Ship. Wt. 8 lbs. **\$12.95 post-paid**
4. A two cylinder double action valve with a unique arrangement, allowing the operator to raise both cylinders simultaneously, to lower them simultaneously or to raise one and lower the other at any predetermined rate and speed. Brand New. Ship. Wt. 8 lbs. A **\$14.95 post-paid**

## VICKERS MF6 HYDRAULIC PUMP OR MOTOR

Compact, powerful, rated 1,000 P.S.I., .507 cu. in. per revolution, 8 gal. per min. at 3750 r.p.m. Change rotation by reversing flow. Delivers up to 6 H.P. BRAND NEW. Wt. 4 1/2 lbs. \$60.00 value for ..... **\$14.95 Postpaid**



## VACUUM-AIR HYDRAULIC GENERAL PURPOSE PUMP

Original Cost

\$45.00

Now Only

\$9.95

Prepaid in

U. S. A.

Use them for OIL BURNERS

—  
SPRAYING MACHINES

—  
MILKING MACHINES

—  
COMPRESSORS

—  
VACUUM PUMPS

—  
HYDRAULIC SYSTEMS

—  
MANURE LOADERS

—  
PRESSES, etc.

**BRAND NEW!**



Worth Many Times This Low Sale Price

• Originally cost \$45.00. May be used as air or fluid pump—for pressure or vacuum. Standard 3/8 inch pipe thread with interchangeable ports. Will pump 7 1/2 gal. SAE 30 oil per minute at 300 RPM. Builds air pressure of 30 lbs. per sq. in. at 1000 RPM. Vacuum will draw 26 inches of mercury at 1750 RPM. Develops up to 120 lbs. per sq. inch of hydraulic pressure, which in conjunction with a 3 inch hydraulic cylinder will lift 840 lbs. minimum. Runs forward or reverse. Self aligning shaft. Die cast aluminum housing 6x4x4 inches. Has stainless alloy steel vanes and impeller. Made by Bendix Avia, Corp. Spline terminal for direct drive—readily replaced with a pulley. Recommend a 1/2 H.P. or stronger electric motor. Rated capacity 1500 RPM with high overload factor. Special price for quantity users. Complete illustrated engineering report and instruction booklet FREE with every pump. Send check or money order today! Postpaid in **\$9.95** U.S.A.....

## BRAND NEW ALL-PURPOSE WATER PUMP

Ready for use on any pumping need. Use it for:

DRAINING BASEMENTS

• HOME WATER SYSTEMS

• FIRE PROTECTION

• PRESSURE BOOSTER

• IRRIGATION

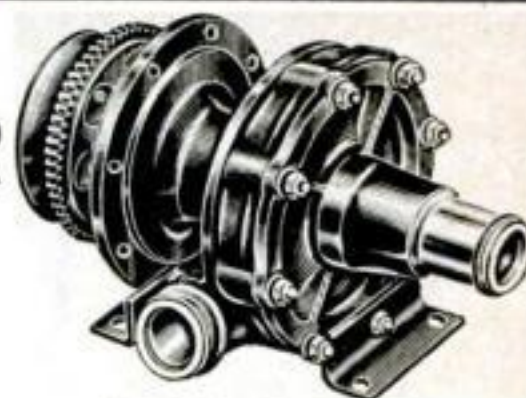
• DRAINING PONDS, TANKS, etc.

• SPRINKLING SYSTEMS

• STOCK WATERING

• INDUSTRIAL PUMPING

Complete with pulley and mounting brackets, ready for use.



## BELT DRIVEN Centrifugal Pump

An extraordinary value for all types of intermittent or continuous pumping in the home . . . farm . . . factory. Built to exact specifications of Packard Motor Car Co. for use in Rolls-Royce Merlin Aircraft Engines. May be run with electric motor. Gas engine or power take-off on tractor. Delivers up to 25 gallons a minute with 1 1/2 H.P. motor; 80 gal. a min. with one H.P. motor. Will deliver up to 44 ft. head or 25 ft. suction. Use 1" outlet hose; 1" or 1 1/2" inlet hose (recommended).

**COMPLETE ENGINEERING REPORTS AND OPERATING INSTRUCTIONS FREE WITH PUMP**

Has cast aluminum housing, accurately machined 5" bronze impeller; 3 1/2" V belt pulley and mounting brackets. Shaft rotates on ball bearing; has grease gun fitting.

Original cost approx. \$88.00. Shipping weight 10 lbs. A **REAL BUY. Satisfaction guaranteed. Mail orders filled promptly.**

**\$21.50** F.O.B. Chicago

Here is YOUR identification stencil set! Ideal for all industries in marking boxes and packages, identifying inventory, numbering doors, etc. GUARANTEED. Saves time, money and effort, easy to use, pays for itself. Metal letters, INTERLOCKING to make words. Comes in handy wooden box with sliding top.

**STENCIL**

**OUTFIT**



**CONTAINS**  
1 stencil brush;  
1 can paint, stencil paste; 1 complete set of metal letters, figures, punctuation and spacers.

**COMPLETE KIT \$2.50** Pre-paid with 1" letters.....

**COMPLETE KIT \$3.95** Pre-paid with 2" letters.....

**U.S. SURPLUS BARGAIN**

## POLAROID GOGGLE KIT



Use them for all outdoor sports, beach, motoring, boating—anything.

Brand New! In original packing. Each with four interchangeable lenses. Shock Proof Frame. Shatterproof Lenses.

Heavy windproof sponge rubber ventilated frame with snap button lens retainers! Adj. elastic head band. Clear, red, green, amber, flexible, shatterproof lens, all instantly interchangeable, with carrying case. They won't last long at this price—it's smart to buy an extra. **\$1.00** Prepaid in U.S.A.

**GROBAN SUPPLY CO. DEPT. P 5-7, 1507 S. MICHIGAN AVE., CHICAGO 5, ILL.**



# INVENTORS

When you are satisfied that you have invented a matter of value—write me, without obligation, for full information as to what steps you should take to secure a Patent or Trademark.

The usual first step is to have a search of the prior U.S. Patents conducted, so that I can report to you on the question of Patentability.

## PATRICK D. BEAVERS

(Formerly RANDOLPH & BEAVERS)  
Registered Patent Attorney

937 Columbian Building, Washington 1, D. C.

**PATRICK D. BEAVERS, Registered Patent Atty.**

937 Columbian Bldg., Washington 1, D. C.

Please send me full information on how to secure Patents & Trademarks.

Name.....

Street.....

City.....State.....

**Make More Money in**

## AUTO BODY and FENDER REPAIRS



**GET THIS BOOK NOW**

In Your Own Home **FREE TRIAL**  
Send No Money

**GET YOURSELF** a share of the big money car owners are spending to keep their older cars looking good. This practical book will put you right into this profitable business. No experience needed. Get a good job or start a business of your own with little or no capital. Biggest selling book of its kind. Thousands in use. Mail coupon today—money back if not fully satisfied.

**Mail Coupon**

**233 Pictures—Diagrams**  
**325 Pages of Vital Facts**  
Covers methods, tools, materials—How to get business—How to start your own shop. Latest information and pictures.

**GOODHEART-WILLCOX CO., Dept. Div. 3-B**  
1321 S. Michigan Avenue, Chicago 16, Ill.

Send Auto Body and Fender Repair, \$3.50. If not satisfactory I will return in 5 days and you will refund money paid.

( ) Remittance enclosed, sent postpaid,  
( ) Send C.O.D. Postage extra.

Name.....

Address.....

City.....State.....



*Approved for Veterans*

GET FREE CATALOG

Prepare NOW for a profitable career. Basic and Advanced Courses in Portrait, Commercial and Color work. Well-established, nationally-known school. Day or evening classes. Immediate enrollment if you hurry! Write today for details.

## BALTIMORE INSTITUTE OF PHOTOGRAPHY

N. Charles at 24th St., Baltimore 18, Md.

## Learn to Service and Repair ELECTRICAL APPLIANCES

Open your own electrical appliance service shop. Complete illustrated course covering washing machines, vacuum cleaners, elec. ranges, motors, house wiring and REFRIGERATION. Appliance tools included. Send today for FREE BOOKLET without obligation.

## PACIFIC TRAINING SCHOOL

7217 So. Broadway, Dept. S-87, Los Angeles 3, Calif.

## WHY DON'T YOU WRITE?

Writing short stories, articles on business, sports, homemaking, gardening, shop crafts, local and club activities, etc., will enable you to earn extra money. In your own home, on your own time, the New York Copy Desk Method teaches you how to write—the way newspaper men learn, by writing. Our unique "Writing Aptitude Test" tells whether you possess the fundamental qualities essential to successful writing. You'll enjoy this test. Write for it, without cost or obligation. **Veterans: This course approved for Veterans' Training.**

## NEWSPAPER INSTITUTE OF AMERICA

SUITE 5728-L, ONE PARK AVENUE, NEW YORK 16, N. Y.

## LEARN MONEY-MAKING CARTOONING

**IN SPARE TIME — by Easy Picture Chart Method**  
Same Simplified Method that has helped train creators of "Terry & Pirates," "Freckles," "Out Our Way," "Winnie Winkle," "Reg'lar Fellers," "Strange As It Seems," "The Neighbors," and many others. Earn while learning. Send 10c for Picture Chart (to test your ability). Samples of successful students, and full details. (State age.)



The Landon School, 4827 Cleveland Transit Bldg., Cleveland, O.

## SHOE REPAIR OFFERS BIG INCOME

LEARN IN 12 WEEKS TIME

You can own your own shop or earn big income as skilled shoe repairman. Growing demand everywhere at top wages for men who know how. We teach you quickly by actually working on shoes and modern machines. Costs nothing under G.I. Bill of Rights. School open to all from 18 to 60 years of age. **Free Big 16 Page Book** explains everything. Send for your copy today.

## MODERN SHOE REBUILDING SCHOOL

Established 1927  
2937 Belmont Ave., Chicago, Ill. **RUSH POSTCARD TODAY!**  
4577 Hollywood Blvd., Los Angeles 27, Calif.



TRAIN

## Your VOICE!

Results GUARANTEED

We build, strengthen the vocal organs—not with singing lessons—but by sound, scientifically correct silent and vocal exercises and absolutely guarantee complete satisfaction with results. Write for Voice Book, FREE. Sent to no one under 17 years old unless signed by parent.

Perfect Voice Studios, Studio 136-B, Kimball Hall Bldg., Chicago 4, Ill.

## LEATHERCRAFT by ROBERT L. THOMPSON

At last—the actual methods of master craftsmen for making professionally finished leather articles—wallets, purses, handbags, belts, key cases, etc. Fully illustrated with hands-at-work photographs and actual job pictures. Send for free examination copy today. After 10 days you may return the book or send \$1.60, plus postage, in full payment to:

**D. VAN NOSTRAND COMPANY, INC.,**  
250 Fourth Avenue, New York 3, N. Y.

Name.....

Address.....

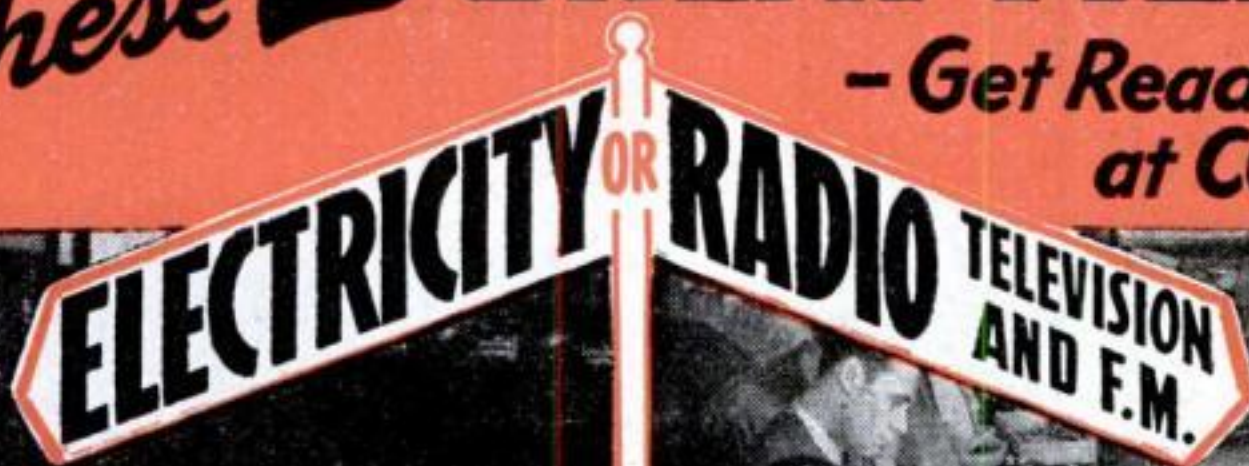
City.....State.....

Pop. Sci.—July 1948



# Choose one of these 2 GREAT FIELDS

— Get Ready **QUICK** at **COYNE!**



This big fire-proof building is occupied entirely by Coyne.

Prepare for Success Quickly... in the

## GREAT SHOPS OF COYNE

Conditions today are different. Many "one-operation" jobs that pay well will not last. Plan for steady pay and advancement by training NOW. Come to the great shops of COYNE in Chicago, for "all-around" training in Electricity or Radio-Television—the 2 great opportunity fields.

### NOT "HOME-STUDY" COURSES

Our famous "Learn-by-Doing" method gives you practical experience on a massive outlay of equipment. Not by correspondence, but actual shop work plus necessary theory. You are trained right here in the great Coyne shops that has been training men and young men for over 49 years.

### ELECTRICITY RADIO TELEVISION and F.M.

#### INCLUDING INDUSTRIAL ELECTRONICS

Big future in Power Plant Work, Motors, Armature Winding, Home and Factory Wiring, Appliances, Refrigeration, Maintenance, Illumination, etc. Electricians are in demand everywhere—lifetime job service to Coyne graduates. Send for BIG FREE BOOK.

A great field now, even greater growth ahead. Here at COYNE you're trained for Construction, Testing, Trouble-Shooting on Radio, Public Address, Sound Picture Units. Training includes FM, Photo-cells, Television, etc. Our training is quick, easy, practical. Many Coyne trained men own well-paying radio businesses of their own.

**LARGEST, OLDEST, BEST EQUIPPED SCHOOL OF ITS KIND IN THE U.S.**

**Pick Field You Like  
—Mail Coupon for  
Big FREE Book**



Whether you prefer Electricity, or Radio, train on actual equipment, at Coyne. We have a big, fully illustrated book on each course, and we'll send you the one you want, without obligation. Mail coupon — TODAY.



### ELECTRIC REFRIGERATION

Added training in Electrical Refrigeration now included with either our Electrical or Radio Course.

**NON-VETERANS** who are short of cash can finance most of their tuition and pay in easy monthly payments after graduation. Many earn while learning.

### VETERANS

COYNE is authorized to train those who qualify for training under G. I. Bill of Rights. Coupon brings Special G. I. Bulletin.

# COYNE

Founded 1899 B. W. COOKE, President  
**ELECTRICAL AND RADIO SCHOOL**

500 So. Paulina Street, Dept. B8-73H, CHICAGO 12, ILL.

B. W. COOKE, President  
COYNE ELECTRICAL AND RADIO SCHOOL  
500 S. Paulina St., Dept. B8-73H, Chicago 12, Ill.

Send me your BIG FREE BOOK — for the course checked below. This does not obligate me and no salesman will call.

☐ ELECTRICITY ☐ RADIO — TELEVISION

NAME.....

ADDRESS.....

CITY.....STATE.....



# The 97 Pound Weakling

who became "The World's Most Perfectly Developed Man"

"I'll Prove that YOU, too, can be a NEW MAN!"

*Charles Atlas*

I KNOW, myself, what it means to have the kind of body that people pity! Of course, you wouldn't know it to look at me now, but I was once a skinny weakling who weighed only 97 lbs. I was ashamed to strip for sports or undress for a swim. I was such a poor specimen of physical development that I was constantly self-conscious and embarrassed. And I felt only HALF-ALIVE.

Then I discovered "Dynamic Tension". It gave me a body that won for me the title "World's Most Perfectly Developed Man."

When I say I can make you over into a man of giant power and energy, I know what I'm talking about. I've seen my new system, "Dynamic Tension", transform hundreds of weak, puny men into Atlas Champions.

## Only 15 Minutes a Day

Do you want big, broad shoulders—a fine, powerful chest—biceps like steel—arms and legs rippling with muscular strength—a stomach ridged with bands of sinewy muscle—and a build you can be proud of? Then just give me the opportunity to prove that "Dynamic Tension" is what you need.

No "ifs," "ands," or "maybes." Just tell me where you want handsome, powerful muscles. Are you fat and flabby? Or skinny and gawky? Are you short-winded, pepless? Do you hold back and let others walk off with the prettiest girls, best jobs, etc.? Then write for details about "Dynamic Tension" and learn how I can make you a healthy, confident, powerful HE-MAN.

"Dynamic Tension" is an entirely NATURAL method. Only 15 minutes of your spare time daily is enough to show amazing results—and it's actually fun! "Dynamic Tension" does the work.



CHARLES ATLAS  
Holder of title, "The World's Most Perfectly Developed Man."

## Send for FREE BOOK

Mail the coupon right now for full details and I'll send you my illustrated book, "Everlasting Health and Strength." Tells all about my "Dynamic Tension" method. Shows actual photos of men I've made into Atlas Champions. It's a valuable book! And it's FREE. Send for your copy today. Mail the coupon to me personally, CHARLES ATLAS, Dept. 1G, 115 East 23rd Street, New York, N. Y.



CHARLES ATLAS, Dept. 1G,  
115 East 23rd St., New York, N. Y.

I want the proof that your system of "Dynamic Tension" will help make a New Man of me—give me a healthy, husky body and big muscular development. Send me your free book, "Everlasting Health and Strength."

Name.....Age.....  
(Please print or write plainly)

Address.....

City.....State.....

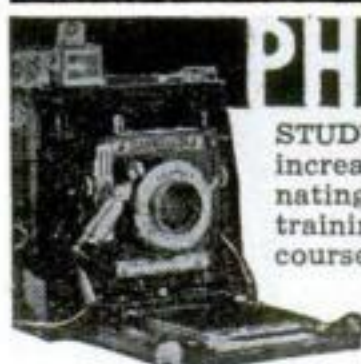
## Practical Shop Training

in  
REFRIGERATION  
AIR CONDITIONING  
and/or

PRACTICAL ELECTRICITY  
MAJOR APPLIANCES  
Service, Maintenance, Installation

Train in  
the Magic  
City of  
the South

Write for Details  
COMMERCIAL TRADES INSTITUTE  
202 SO. 20TH ST., BIRMINGHAM, ALA.  
Veterans Inquire About GI Training



## PHOTOGRAPHY

STUDY AT HOME. Photography offers ever-increasing opportunities for well-paid, fascinating careers. Success-proved N. Y. I. training qualifies you at home. Also resident courses. 38th year. Details FREE!

NEW YORK INSTITUTE  
OF PHOTOGRAPHY  
Dept. 5, 10 West 33 St., New York 1, N. Y.

## HELP FOR INVENTORS

Hundreds of manufacturers have requested our assistance in locating marketable new products.

Complete information, free.

INSTITUTE of AMERICAN INVENTORS  
Dept. 3, 1926 Eye St. N.W., Washington 6, D. C.

## INVENTORS

Whether an invention is patentable can be substantially determined by a search of the U. S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

JOHN N. RANDOLPH

Registered Patent Attorney

205 Columbian Building, Washington 1, D. C.



# PATENTS

## AND TRADE MARKS

## C. A. SNOW & CO.

REGISTERED PATENT ATTORNEYS

WRITE FOR INFORMATION TO

246 SNOW BUILDING, WASHINGTON 1, D. C.



## INVENTORS

IF YOU WISH TO PROTECT YOUR INVENTION,  
You should take steps to protect it by a U. S. Patent.  
Write me for "Record of Invention" form.

CARL MILLER  
REGISTERED PATENT ATTORNEY

Woolworth Bldg., 35th Floor, Dept. 78-C, New York City  
Please send me "Record of Invention" form.

NAME.....

ADDRESS.....



Now IN YOUR OWN HOME Learn

# RADIO ELECTRONICS

The Practical  
"HOME-TESTED"  
Modern "A-B-C" Way

YOU USE ALL OF THESE RADIO PARTS  
TO BUILD  
AND OPERATE  
**7**  
DIFFERENT RADIO  
RECEIVING CIRCUITS

## NO PREVIOUS RADIO OR ELECTRICAL EXPERIENCE NECESSARY

DeForest's Training, Inc. provides every major home study aid to help you learn Radio-Electronics rapidly and thoroughly . . . to give you the experience and confidence needed for a responsible, Good-Pay Job, or to Start a Business of Your Own! Here is a REAL opportunity field for YOU . . . when you are a trained Radio-Electronics man! Just think of the tremendously exciting future ahead of FM Radio, Aviation and Broadcast Radio, Sound Motion Picture Equipment, Servicing and Sales of Radio Equipment, etc. Put yourself in this picture . . . See how you can benefit from a PRACTICAL training in this fascinating work! Think, too, of the coming possibilities ahead of Radar, Facsimile and Television. Send TODAY for the interesting, opportunity-revealing book, "Victory for You!" See how others probably no more talented or ambitious than you, have advanced in earning power after this training . . . how YOU can do it too! Mail the coupon NOW!

### INCLUDING:

1. Simple Receiver
2. Two Tube Receiver
3. Tuned Radio-Frequency Receiver
4. Short Wave Receiver
5. Aviation Band Receiver
6. 4-Tube Superheterodyne
7. 5-Tube Superheterodyne with Magic Tuning Eye

... PLUS SCORES  
OF OTHER  
FASCINATING, INSTRUCTIVE  
RADIO-ELECTRONIC  
EXPERIMENTS

### WITH THE HELP OF

**A** EIGHT Big Kits of Actual "Learn-by-Doing" Radio Parts and Assemblies with which you make 133 fascinating SHOP METHOD EXPERIMENTS in your own home! Imagine building 7 different Radio Receivers that operate!

**B** A 16 mm Home Movie Projector and Twelve Reels of "Learn-by-Seeing" Home Movie Films . . . for picture-clear, fast understanding of Radio Fundamentals!

**C** Modern, well-illustrated, Loose-leaf Lessons, prepared in clear, simple, understandable language . . . to guide you throughout your training!

### THEN GET THE HELP OF OUR EFFECTIVE EMPLOYMENT SERVICE

YOU USE  
"LEARN-BY-SEEING"  
MOVIES

DEFOREST'S TRAINING, INC. INCLUDES INSTRUCTION IN MOTION PICTURE SOUND EQUIPMENT, FM RADIO AND TELEVISION . . . RESIDENTIAL TRAINING IN OUR MODERN CHICAGO LABORATORIES ALSO AVAILABLE—ASK US FOR INFORMATION!

#### TELEVISION

offers exciting opportunities in a growing number of areas for men with the proper training and background. D.F.T. is helping many of its graduates get started in this fascinating field. Write for full details now.

DeForest's Training, Inc.  
2533 N. Ashland Ave., Dept. PS-E7  
Chicago 14, Illinois

Send me complete details showing how I may make my start in Radio-Electronics-Television. No obligation.

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_ Apt. \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

☐ If under 16, check here for special information.

☐ If a discharged veteran of World War II, check here.

**DeForest's Training, Inc.** CHICAGO, ILLINOIS

Associated with the DeVee Corporation, Builders of Electronic and Movie Equipment



# WORK FOR THE



## GOVERNMENT

**START**  
**As High As \$3,021 YEAR**

*Veterans Get Special Preference*

### MEN—WOMEN

Postoffice Clerks, Carriers  
Storekeepers-Gaugers  
Patrol Inspectors  
Stenographers-Typists  
Many Other Jobs

**PREPARE  
IMMEDIATELY**  
Common Education  
Often Sufficient

Mail  
Coupon  
TODAY

Name.....

Address.....Vet?.....

### Franklin Institute

Dept. D-81  
ROCHESTER 4, N. Y.

Gentlemen: Rush to me  
FREE of charge, list of  
U. S. Government big pay  
jobs. Send FREE 40-page  
book describing salaries, va-  
cations, hours, work. Tell me  
how to qualify for one of these  
jobs.

## VETERANS Learn WATCHMAKING

### A Lifetime Career

*No Age, nor Physical  
Limitations*

### YOUR OPPORTUNITY

To Lift Yourself from a  
Futureless Job



Approved  
G. I. Training

### LEARN WATCHMAKING

and earn from the start, higher than average pay . . . easy  
hours . . . ideal working conditions . . . be prepared to  
establish your own business.

### WATCH REPAIRING—JEWELRY—ENGRAVING

*Always in Demand*

Requests for our Graduates from Everywhere. Permanent  
positions (no layoffs) \$75.00—\$100 per week for trained  
men. Write today for latest FREE Catalog.

### KANSAS CITY SCHOOL OF WATCHMAKING

America's Most Progressive Horological School  
619 WYANDOTTE ST. KANSAS CITY 6, MO.

## STEP INTO THE AUTOMOTIVE INDUSTRY—A TRAINED MAN! PRACTICAL SHOP TRAINING

IN

### AUTOMOTIVE MECHANICS BODY and FENDER REBUILDING

*If interested write or wire*

### ATLANTA MOTIVE TRADES INSTITUTE

Dept. C, 254 IVY ST., N.E.,  
Atlanta, Georgia

Veterans ask about G I Training

## Learn to MOUNT BIRDS



### Tan SKINS, make up FURS

Be a Taxidermist. Double your hunting fun. We  
teach you at Home. Mount Birds, Animals, Fish,  
Heads, common specimens. Fur and profits. Decorate  
home and den **MAKE MONEY**. Mount game, tan for  
others. Big profits in spare time. **WRITE TODAY.**

100 game pictures in **FREE BOOK**

Hunters, get your copy. It's

Now Free. Send post card. State your AGE.

**NORTHWESTERN SCHOOL OF TAXIDERM**  
Dept. 2607 Omaha, Nebraska

### ILLUSTRATED AVIATION COURSE

in one  
BOOK

### "COMPLETE FLYING MANUAL"

48 lessons in one big book

at the bargain price of ONLY.....

For everyone now flying or planning to fly! Tested  
and proved visual method makes learning easy  
and enjoyable; edited by Lt. Col. H. E. Hartney,  
USACR. 24 ground, 24 air lessons; controls, taxi-  
ing, straight and level flying, climbing, turning,  
take-off, landing, navigation, instruments, etc.  
Clear text, 340 picture-diagrams, 128 giant pages,  
durable binding.

**NATIONAL AERONAUTICS COUNCIL, INC.**  
Dept. 807, 37 West 47th St., New York 19, N. Y.

**\$2.98**

on  
approval

**SEND NO MONEY**  
Order on postcard! Ex-  
amine book 7 days; re-  
turn or send only \$2.98  
plus postage. (Send pay-  
ment now and we pay  
postage; refund guar-  
anteed.)

### HYPNOTIZE ANYONE



Yes, anyone. Learn modern  
speed hypnotism. Self-hyp-  
nosis. Secrets revealed.  
Exciting experiments. Over-  
come inferiority complexes,  
smoking, alcoholism, stut-  
tering, nailbiting, phobias,  
insomnia, stagefright. Im-  
prove your memory. Pri-  
vate & class instruction  
available at Institute.  
Complete homestudy \$2  
course.....

**POWERS INSTITUTE OF HYPNOTISM, 1324 Wilshire Blvd., Dept. 36, Hollywood 14, Calif.**

### New Designs in

### FRANZITE GRIPS

### Modernize Your Gun! Improve Your Score!

Most durable grips made. Positively un-  
breakable! For Colt, Smith & Wesson, Hi-Standard.  
Ortgies, Luger & Mausers in a wide choice of beautiful  
designs in ivory, pearl, walnut, onyx, etc. Low prices. **FREE**  
CATALOG. Dealers Wanted.

**SPORTS, INC., (Mfrs.) 5501 Broadway, Dept. S-7, Chicago 40, Ill.**

## RUPTURED?

### Get Relief This Proven Way

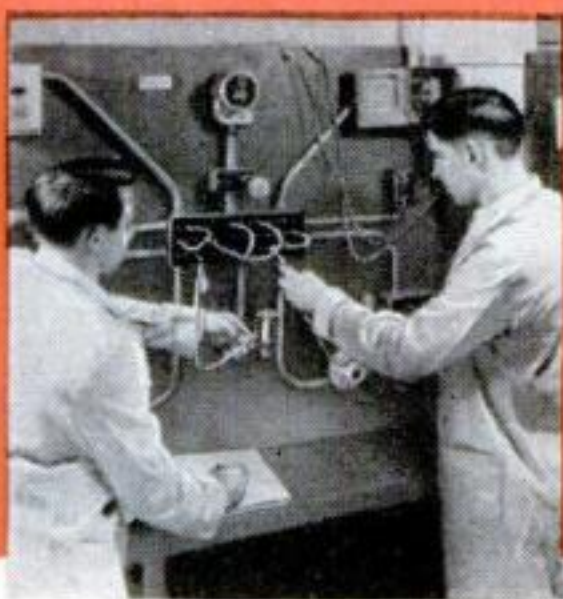
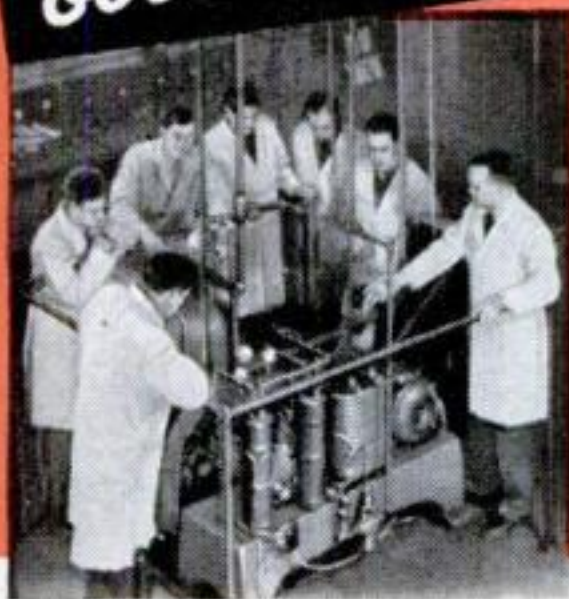
Why try to worry along with trusses that gouge your  
flesh—press heavily on hips and spine—enlarge opening—  
fail to hold rupture? You need the Cluthe. No leg-straps  
or cutting belts. Automatic adjustable pad holds at real  
opening—follows every body movement with instant in-  
creased support in case of strain. Cannot slip whether at  
work or play. Light. Waterproof. Can be worn in bath.  
Send for amazing **FREE** book, "Advice To Ruptured," and  
details of liberal truthful 60-day trial offer. Also endorse-  
ments from grateful users in your neighborhood. Write:

**Cluthe Sons, Dept. 14, Bloomfield, New Jersey**



AMERICA'S  
FOREMOST SCHOOL OF  
PRACTICAL TRAINING  
**IS READY TO  
PREPARE YOU  
NOW FOR A  
GOOD JOB IN—**

# REFRIGERATION AIR CONDITIONING



**TRAIN BOTH AT HOME**



What's YOUR ambition? Better pay? An interesting job? Your own business? They're all waiting for you **right now** in Refrigeration and Air Conditioning! The tremendous growth of this great industry is almost unbelievable ... and a growing industry needs trained men. If you're mechanically inclined and like to work with tools ... Refrigeration and Air Conditioning offers you a bright future. In a few short months Industrial Training Institute ... America's foremost school of practical training—will prepare you to step into a good paying job with plenty of opportunity to advance.

## Home and Shop Training

Under the famous ITI 2-Way Plan you get all the fundamentals of Refrigeration and Air Conditioning at home ... during spare hours. Keep your present job and income while training. Upon completion of your ITI Home Study you come to Chicago, with transportation paid, for a **FULL FOUR WEEKS** of practical training in our great shops. You actually work with the same kind of equipment you'll meet on the job.

**AND IN ITI'S BIG SHOPS**



## WARM AIR HEATING INCLUDED

ITI Training is best for you because it's really complete ... **including the huge field of Warm Air Heating to boost your income.** You learn *both* the "how" and the "why" of servicing, repairing, installing and rebuilding both home and commercial equipment. The ITI graduate is qualified to handle any practical job in the industry.

## AN OLD ESTABLISHED SCHOOL

Established in 1916, ITI has given training to over 400,000 men. Thousands of its graduates hold key jobs at top income. This great school, occupying five large buildings with over \$500,000.00 invested in training equipment and facilities, offers you the training you need for a flying start to success.

## ITI TRAINING 100% PRACTICAL

You need no special schooling or experience. ITI training is easy to grasp, simple, 100% practical. No dull mathematics or complicated theory. ITI lesson Work Sheets are written in simple English. **After graduation, ITI's Job Placement Help Department will help you find the job you want.**

## GET THE FACTS NOW—Mail Coupon!

Find out what's ahead for you in Refrigeration and Air Conditioning. See how simple it is to study at home and prepare yourself for a fine job with a splendid future. It's all in our fascinating, illustrated **FREE** book, "Your Future in Refrigeration and Air Conditioning." Just fill out and mail the coupon for your **FREE** copy. Take this first step today.

### VETERANS:

ITI residence training is fully approved under the GI Bill of Rights. Check coupon for special veterans' bulletin.

**NON-VETERANS:** get the facts about convenient ITI tuition terms.

## MAIL COUPON TODAY FOR FREE BOOK!

Mr. C. H. Smith, President,  
INDUSTRIAL TRAINING INSTITUTE  
2150 Lawrence Ave.,  
Dept. G-2, Chicago 25, Ill.

Please send me **FREE** the ITI book, "Your Future in Refrigeration and Air Conditioning" and information about the opportunities for trained men in this fast growing field. I understand I'm under no obligation.



NAME \_\_\_\_\_ AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

ARE YOU A VETERAN? \_\_\_\_\_



**INDUSTRIAL TRAINING INSTITUTE**  
Formerly the L. L. Cooke School of Electricity & Refrigeration & Air Conditioning Institute  
Dept. G-2, 2150 LAWRENCE AVE., CHICAGO 25, ILL.



# MODERN LAWN MOWER SHARPENER

## PROFITS and SPEED



PRICE  
**\$241.50**  
LESS  
MOTOR

INCREASES PROFITS • INCREASES SALES  
FOR LAWN MOWER SHOPS •  
FIXIT SHOPS • LOCKSMITHS •  
HARDWARE STORES • GOLF COURSES • SCHOOLS  
PARKS • PLAYGROUNDS • INSTITUTIONS •  
CEMETERIES • AND ALERT INDIVIDUALS!

*Sharpens All Reel Type Mowers • Hand, Power or  
Gang • 10 to 20 Minutes • No Dismantling  
No Extra Attachments Needed*

All reel type mowers, from 5-inch edgers to 36-inch power mowers, are quickly sharpened to extreme ends of both left and right twist reel blades. Handle, wheels, roller and motor remain in place when sharpening is in process. Bed knife is sharpened in same brackets that hold mower in grinding position. No extra attachments required. One lever puts mower or bed knife in grinding position. 100% steel construction. Grinding head rides on five ball bearing races. Small, compact, easy to operate. Sharpens wood chisels, joiner knives and planer blades without extra attachments.

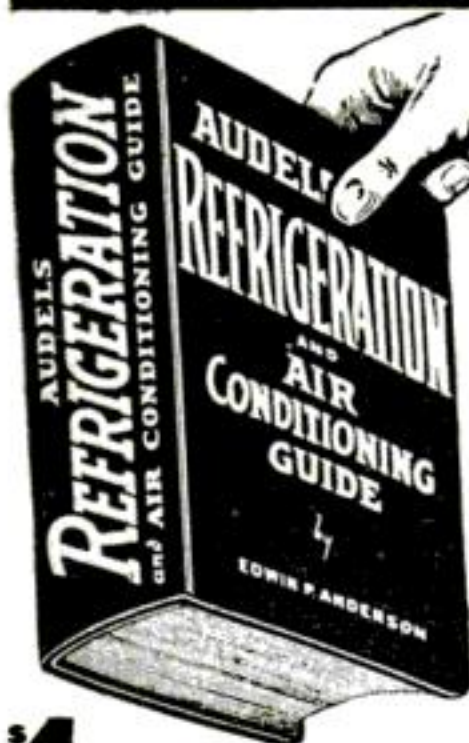
ORDER  
NOW  
Immediate  
Delivery

*Skate Sharpener Attachment Available  
1/3 H.P., 60-Cycle G.E. Motors Now Available \$21.50  
Send For Free Bulletin No. 11B*

MODERN MFG. CO. 160 N. FAIR OAKS AVE  
PASADENA, CALIFORNIA

NOW READY—NEW FROM COVER TO COVER

## AUDELS REFRIGERATION and AIR CONDITIONING GUIDE



4 Books in One! Covering:  
Basic principles, Servicing,  
Operation, Repair of  
1—Household Refrigeration  
2—Special Refrigeration Units  
3—Commercial &  
Industrial Refrigeration  
4—Air Conditioning Systems  
A gold mine of essential  
important facts for ENGI-  
NEERS, SERVICEMEN &  
USERS.  
A Good Book is a Good Friend!  
Here you have at your fingers'  
ends a Complete Library in  
ONE VOLUME, the neces-  
sary data you have been look-  
ing for on: MODERN UNITS,  
SYSTEMS & MACHINES,  
REFRIGERANTS, including  
Freon, Lockers, Water Cool-  
ers, Quick Freezing & Air  
Conditioning Systems.  
1280 Pages, 46 chapters all  
Fully Illustrated & Indexed for  
Ready Reference

ANSWERS YOUR QUESTIONS  
Get This Information for Yourself.  
Mail Coupon Today. No Obligation  
Unless Satisfied. ASK TO SEE IT.

**\$4 COMPLETE • PAY ONLY \$1. A MONTH**

AUDEL, Publishers, 49 W. 23rd St., New York 10, N.Y.  
MAIL AUDELS NEW REFRIGERATION GUIDE for free examination. If O.K.  
I will send you \$1 in 7 days; then remit \$1 monthly until price of \$4 is  
paid. Otherwise I will return it.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Occupation \_\_\_\_\_  
Employed by \_\_\_\_\_ PSM

30 POPULAR SCIENCE

## An ASSURED FUTURE for You Learn Profitable WATCH REPAIRING

**BIG MONEY WHILE LEARNING**  
*Study at Home — or at Our Accredited School*  
Complete Home Correspondence Course or G. I. Approved  
Residence School Plan. Also, Post-Graduate Plan at school  
for correspondence students.

Write Today for COMPLETE DETAILS to  
**American Institute of Specialized Watch Repair**  
Dept. 200 270-76 East Building Grand Rapids, Michigan

## BE A REAL ESTATE BROKER PAYS BIG!

**EASY TO LEARN**—Start and  
run your own business quickly.  
Many graduates report making up to \$1000 a month. Course  
of study covers Sales, Property Management, Appraising,  
Loans, Mortgages and hundreds of related subjects. Course  
in home study or classroom instruction in leading  
cities. Big new illustrated catalog from this  
nationally known school. G. I. Approved. Send  
**FREE** a Post Card Today.

**WEAVER SCHOOL OF REAL ESTATE** (Estab. 1936)  
15 E. Pershing Road Dept. PC Kansas City, Mo.

## THERE'S MONEY IN CARTOONS!

RAYE BURNS will teach you HOW to CREATE ORIGINAL  
CARTOONS at home that you may SELL! Course contains  
26 lessons and over 600 illustrations. All for Only..

**\$2.85**

Send name and address for free details.

RAYE BURNS SCHOOL, Dept. 8, Box 3583, CLEVELAND, OHIO

## WATCHMAKING

Millions of watches and clocks need repairing. Start your training  
now for a better paying job or own profitable business. Qualified  
watchmakers in demand. Outstanding training by experts. Write for  
free catalog. Approved for veterans.

**SCIENTIFIC SCHOOL OF WATCHMAKING, Dept. PS-7**  
3923 San Fernando Road Glendale 4, Calif.

Say You Saw

It In Popular Science

Free  
Book



## RAISE HAMSTERS

The new wonder animals from Syria.  
Often called Toy Bears. Delightful pets.  
Everyone wants them. Laboratories need  
thousands. Clean, odorless. Raise any-  
where. A profitable and interesting hobby  
or business. We furnish breeders and instruc-  
tions. Write today for free book.

GULF HAMSTERY, 1540 BASIL ST., MOBILE, ALA.



## EXCITING FILMS

Extraordinary and unusual 8-16mm. Silent and  
Sound Films to thrill your Home Movie Audiences.

For Sample Film and Special List send only 10c to...

**EXCITING FILMS** 1071 EL CENTRO  
HOLLYWOOD 38, CAL.

## MONEY for MEN ALL FREE

THE PLASTEX Industry needs manufacturers on small  
scale and for big production of Lamp and Clock Stands,  
Art Goods and Novelties in Plastex and Marble imita-  
tion. Experience unnecessary. 1/2c material makes regu-  
lar 10c store sellers. Rubber moulds furnished for  
speed production. Small investment brings good re-  
turns. Big chain store orders now being placed. Ambi-  
tious men have chance for real prosperity. Our Free  
booklet will interest and benefit you.

PLASTEX INDUSTRIES, Dept. 2, 3400 Third Ave., New York 58, N.Y.



# BE A BUILDING CONTRACTOR

## Big Earning Opportunities



### BUILDING CONTRACTING FREE...

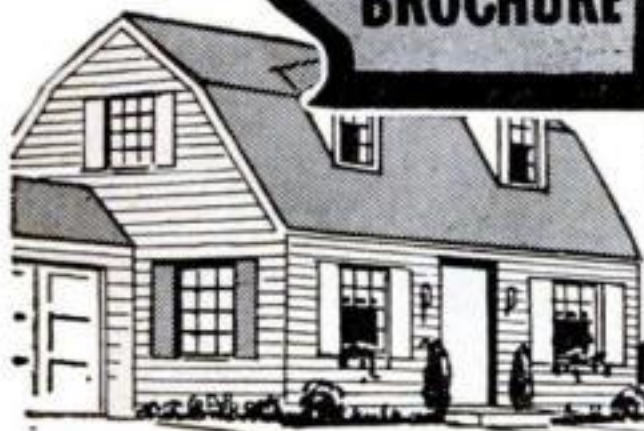
Important Information Telling How To Get Started.

### LEARN ABOUT the HOME BUILDERS TRAINING INSTITUTE PLAN...

Essential facts whether you are a tradesman in the building field or whether you have no previous experience.

Action Going On Now in the Building Industry.

**MAIL COUPON  
TODAY FOR  
FREE  
ILLUSTRATED  
BROCHURE**



The building boom will last for many years. Prompt action now will get you started now—will put you in line for a big-paying job or a business of your own.

### DO YOU WANT TO BE ON THE INSIDE IN THE BUILDING BOOM AHEAD?

■ Big years right ahead in Building. Right now eighteen million Americans who do not own homes are being educated to advantages to them in home ownership! Do you want to be on the inside in the building boom—where big money is made? This is your chance now. Learn about opportunities for Building Contractors whether or not you have previous experience in this field. Millions of dollars are going to be made in home and farm buildings, in construction of stores, garages, small industrial buildings.

### BUILDING INDUSTRY NEEDS MEN WITH ORGANIZING ABILITY

■ The Building Industry uses men with organizing ability by the thousands in construction, supervision, management, sales. Properly trained men needed in production, distribution, finance, installation, marketing. Government estimates housing demand at 40 billion dollars!

### PRACTICAL HOME STUDY TRAINING—EASY TO LEARN BY THIS PLAN

■ Commercial Trades Institute has developed a training program that makes rapid progress possible. Gives you the all around training you want to prepare you for your advancement. Modern methods making use of visual aid illustrations make it easy to learn. From very first lesson assignments the type of information provided is the kind that can be useful to a man taking part in building.

#### GET FREE INFORMATION NOW MAIL COUPON—NO OBLIGATION

Others are preparing to get in now! Act immediately! To delay preparing yourself is certainly to put yourself at a disadvantage. The building industry is going forward rapidly. Fill out, mail coupon today. No obligation.

Commercial Trades Institute, Dept. DI-7

#### Billions for Housing Needs

According to a report called "America's Needs and Resources" made available by the Twentieth Century Fund, a capital expenditure of \$85,000,000,000 to \$87,000,000,000 would be needed to fulfill America's housing needs in the next few years.

### → FILL OUT—CUT OUT—MAIL TODAY ←

#### FACTS FREE for Men Who Want to Get Ahead

Commercial Trades Institute, Dept. DI-7  
1400 Greenleaf Ave., Chicago 26, Illinois

Send free illustrated Brochure and other information about Building Contracting.

☐ VETERAN

☐ NON-VETERAN

Name .....

Address .....

City ..... State .....



BE A WINNER AT ANYTHING YOU TACKLE WITH **PROGRESSIVE POWER** Now **ALL 5 FAMOUS JOWETT COURSES** in 1 Volume For only **25c**

**WHAM!** DARLING, THAT BULLY WON'T PICK ON YOU AGAIN.

JOE YOUR NEW ENERGY AND APPEARANCE SURE DO A GOOD JOB! YOU EARNED YOUR PROMOTION.

"The Jowett System is the greatest in the world!" says R. F. Kelly, Physical Director, Atlantic City



George F. Jowett

Let's Go, Pal! I'll prove I can make YOU an **"ALL-AROUND" HE-MAN** FAST—or NO COST! says George F. Jowett World's Greatest Body Builder

Enjoy My "Progressive Power" Strength Secrets! Give Me 10 Easy Minutes a Day—Without Strain!

I'll teach you the "Progressive Power Method" through which I rebuilt myself from a physical wreck the doctors condemned to die at 15, to the holder of more strength records than any other living athlete or teacher! "Progressive Power" has proven its ability to build the strongest, handsomest men in the world. And I stand ready to show you on a money back basis—that no matter how flabby or puny you are I can do the same for you right in your own home. Let me prove I can add inches to your arms, broaden your shoulders, give you a man-sized chest, powerful legs and a Rock-like back—in fact, power pack your whole body so quickly it will amaze you! Yes, I'll jam you with power and confidence to master any situation—to win popularity—and to get ahead on the job! Through my proven secrets I bring to life new power in you inside and out, until YOU are fully satisfied you are the man you want to be.

**PROVE IT TO YOURSELF IN ONE NIGHT**

Send only 25c for my 5 easy-to-follow, picture-packed courses now in 1 complete volume "How to Become a Muscular He-Man." Try it for one night! Experience the thrilling strength that surges through your muscles.

whom experts call "Champion of Champions" • World's wrestling and weight lifting champ at 18 and 19 • World's Strongest Arms • 4 times World's Perfect Body—plus other records!

**10 DAY TRIAL!** Think of it—all five of these famous courses now in one picture-packed muscle-building volume for only 25c. If you don't actually FEEL results within ONE WEEK, send it back and your money will be promptly refunded!

**PHOTO BOOK OF FAMOUS STRONG MEN!**

**FREE!**

Photos that inspire you to might and muscle. Free with order.

I am making a drive for thousands of new friends fast—REGARDLESS OF COST!

**SO GET NOW MY 5 Muscle Building Courses** (Valued at \$5 each) **All in 1 Great Complete Volume Packed With How-To-Do-It Pictures!** For **25c** Only

Now, this "get-acquainted," extremely low price of only 25c is your chance to build a body you'll be proud of! Follow Jowett's easy method of muscle building NOW!



**FREE GIFT COUPON!**

Jowett Institute of Physical Culture Dept. PS-87 230 Fifth Avenue, New York 1, N. Y.

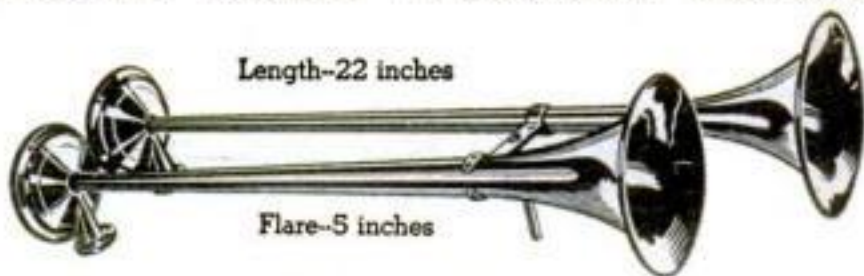
George F. Jowett:—Please send by return mail, prepaid, FREE Jowett's Photo Book of Strong Men, along with all 5 Muscle Building Courses. 1. Molding a Mighty Chest. 2. Molding a Mighty Arm. 3. Molding a Mighty Grip. 4. Molding a Mighty Back. 5. Molding Mighty Legs—Now all in One Volume "How to Become a Muscular He-Man." Enclosed find 25c, NO C.O.D.'S.

George F. Jowett Champion of Champions

NAME.....AGE..... (Please Print Plainly, Include Zone Number)

ADDRESS.....

# CADET DUAL VACUUM HORNS



Length—22 inches

Flare—5 inches

**At the Low Price We Can All Afford**

Here is your chance to get air horn results—looks, blast and beautiful organ tone—at a fraction of the cost of air horns. Spun brass with gleaming chrome finish or lasting lacquer. Positive operation. Complete unit consists of one pair of beautiful vacuum horns with the mounting brackets, valve, control handle, hose, fittings and installation instructions. Can be mounted on front fender or on top of or under the hood. A must for safety and smart appearance for any car. Chrome finish \$29.50—Lacquer finish \$23.75. Send check or money order and we will pay the postage—or order C.O.D.

The Protectured Company Dept. 502 4033 Windsor Road Youngstown 7, Ohio



You can become a good Business Writer, and you can learn Shaded Writing also at home during spare time by my Simplified Method, without cost of going away to school. Easy Lessons. Diploma. Write for my FREE BOOK, "How to Become an Expert Penman," which shows what others have learned. Send 10c for Special Penpoint and your name with a flourished bird written on a card. Write TODAY.



Send for this FREE Book T. M. TEVIS BOX 25R CHILLICOTHE, MO.

**GET INTO CARTOONING!** Let Hartman teach you cartooning, gag writing at home. Learn by mail from a professional! Send Name, Address for FREE DETAILS. Hartman Studios, 2776 California Court, Lincoln 8, Nebr.

# ICELESS ICE!

COLDER - CLEANER - CHEAPER

Complete formula, instructions, 25c.

DUFFY, Box 523-S, Covington, Ky.



**DRAINS CELLARS, WASH TRAYS CIRCULATES OIL**

Pumps 1800 GPH 300 gal. 30' high, uses 1/8 to 1/3 HP motor. Will not clog. **\$6.50**

Postpaid if cash with order. (Add 50c for west of the Mississippi.)

Thousands in use since 1936

LABAWCO PUMPS, BELLE MEAD 3, N. J.



**makes False Teeth TIGHT**

Makes loose dental plates fit snugly and comfortably. LASTS for MONTHS!

Simply squeeze on dental plate and put it in your mouth. Hardens and becomes part of plate. Money-back guarantee.

FREE Generous package of Dental Plate Cleanser with each order. Send \$1.00 or mailed parcel post collect.

Fit-Rite Co., 1573 Milwaukee Ave. Dept. 7-42 Chicago, Ill.



# SHINE WITHOUT 'POLISH'

New Invention! • Sells Like Wild



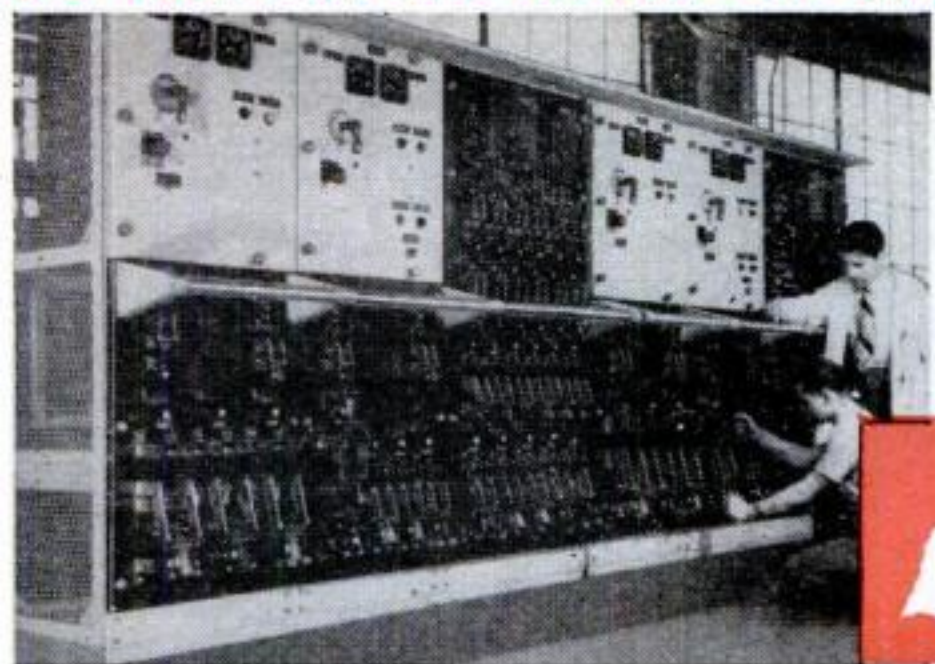
Replaces messy pastes, liquids. Simply glide over shoes—and presto!—you have a lustrous, long-lasting shine. No mess. No muss. No soiled hands. Clean. Handy. WORKS LIKE MAGIC! For Men's, Women's and Children's Shoes. Low priced. Lightning seller!

**SAMPLES FOR AGENTS** Sample offer sent immediately to all who send name at once. A penny postal will do. SEND NO MONEY—just your name.

KRISTEE CO., 703 Bar Street, AKRON, OHIO

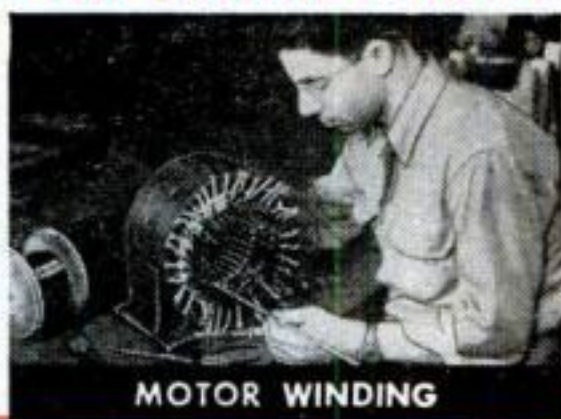


# DO ELECTRICAL WORK ON REAL EQUIPMENT IN M. T. I. SHOPS



POWER DISTRIBUTION PANEL AT M. T. I.

Why Spend Years  
"Picking-Up" a  
Trade? . . . This  
"Live" Industry  
Needs Trained  
Men NOW!  
*Learn*



MOTOR WINDING

## ELECTRICITY

The Nation's  
LARGEST, EXCLUSIVE  
*School of Electricity*



MAIL  
TODAY

There is no other place . . . no other way to get the same all-around electrical training you get at M.T.I. NOT A HOME STUDY COURSE! . . . You get actual "hands-on-equipment" experience in our great modern resident shops in Detroit. No previous experience necessary. Learn HOUSE-WIRING, A.C. D.C. MOTORS and CONTROLS, MOTOR REBUILDING AND ARMATURE WINDING, CONSTRUCTION and MAINTENANCE WORK, etc. New classes every few weeks. Living arrangements made.

**EARN WHILE YOU LEARN**  
Our part-time job assistance helps you meet living expenses while attending M.T.I.

**NO COST TO VETERANS**  
Get \$75.00 to \$120.00 monthly subsistence. Easy Pay Plan for Non-Vets. Mail coupon today.

MICHIGAN TECHNICAL INSTITUTE, Dept. PS-7  
2281 W. Fort St., Detroit 16, Michigan

RUSH your FREE CATALOG and complete information. (No obligation and no salesman will call.)

☐ Veteran ☐ Non-Veteran

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

**MICHIGAN TECHNICAL INSTITUTE**  
2281 West Fort Street Dept. PS-7 Detroit 16, Michigan

# WHICH OF THESE *Opportunities* INTERESTS *You* MOST?

● *Today*, choose the job you want—and prepare for it. Or if you are already engaged in the work you like best, start training *now* for quicker promotion. Acquire the knowledge that will help you to get ahead faster, make more money and have greater security.

American School, founded in 1897 as an educational institution *not for profit*, can help you to reach your goal just as it has helped others during the past fifty-one years. Check the coupon at right, add your name and address and mail it at once. The school will send you details on its training plan and outline of study prepared by specialists. There is no charge, no obligation, so send the coupon immediately.

## CHECK, CLIP AND MAIL COUPON NOW

AMERICAN SCHOOL, Dept. GB46, Drexel at 58th, Chicago 37, Ill.  
Without obligation, Please send FREE and postpaid, bulletin and details of the Subjects checked:

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> PLASTICS ENG'G            | <input type="checkbox"/> Accounting                   | <input type="checkbox"/> Drafting and Design for Men and Women |
| <input type="checkbox"/> Refrigeration             | <input type="checkbox"/> Electrical Engr.             | <input type="checkbox"/> Radio                                 |
| <input type="checkbox"/> Architecture and Building | <input type="checkbox"/> Electricity-Pract.           | <input type="checkbox"/> High School                           |
| <input type="checkbox"/> Contracting               | <input type="checkbox"/> Electronics, Industrial      | <input type="checkbox"/> Air Conditioning                      |
| <input type="checkbox"/> Practical Plumbing        | <input type="checkbox"/> Bookkeeping                  | <input type="checkbox"/> Mechanical Eng.                       |
| <input type="checkbox"/> Automotive Engr.          | <input type="checkbox"/> Private Secretary            | <input type="checkbox"/> Shop Management                       |
| <input type="checkbox"/> Aviation Drafting         | <input type="checkbox"/> Diesel Engineering           | <input type="checkbox"/> Tool Making                           |
| <input type="checkbox"/> Aviation                  | <input type="checkbox"/> Sheet Metal Pattern Drafting | <input type="checkbox"/> Better Foremanship                    |
| <input type="checkbox"/> Business Management       | <input type="checkbox"/> Railway Training             | <input type="checkbox"/> Machine Shop Operations               |

Name ..... Occupation .....  
Address ..... Age .....  
City ..... State .....

**AMERICAN SCHOOL**

Dept. GB-46, Drexel at 58th Street, Chicago 37



# EVEN IF YOU DON'T KNOW A NOTE OF MUSIC NOW...

**YOU CAN LEARN YOUR FAVORITE  
INSTRUMENT THIS EASY A-B-C WAY**

● No special talent, no previous training needed. This U. S. School home-study method is so successful because you learn to play by playing real tunes by note, right from the start. And just think, you can learn your favorite instrument for only a few cents a day!

If interested, mail coupon for FREE Booklet and Print and Picture Sample. See for yourself how easy it is to learn any instrument, right at home, in spare time, without a private teacher. U. S.

**SCHOOL OF  
MUSIC,**  
87 Brunswick  
Bldg.,  
New York  
10, N. Y.



## FREE! Print and Picture Sample

U. S. School of Music, 87 Brunswick Bldg., New York 10, N. Y. Please send me FREE Print and Picture Sample and Illustrated Booklet. I am interested in the instrument checked below.

<input type="checkbox"/> Piano	<input type="checkbox"/> Piano Accordion	<input type="checkbox"/> Tenor Banjo
<input type="checkbox"/> Guitar	<input type="checkbox"/> Saxophone	<input type="checkbox"/> Modern Elementary Harmony
<input type="checkbox"/> Violin	<input type="checkbox"/> Trumpet, Cornet	<input type="checkbox"/> Other Instrument

Name.....  
(Please Print)

Street.....

City.....State.....



*for AMAZING Acceleration*

**GET THIS  
DIXIE WESTERN  
Polished Aluminum  
DUAL INTAKE  
MANIFOLD**

*For Fords and Mercurys  
increases mileage  
speed and performance*

DIXIE WESTERN MANIFOLD CO.  
Dept. S. Box 364 Los Angeles 43, Calif.  
Gentlemen Please send me.

☐ Dual Manifold Set  
☐ Gas Line and Throttle Kit  
☐ Chrome Plated Velocity Stack  
to fit my.....

(year and make of car)  
☐ Check enclosed ☐ Ship C.O.D.

Name.....

Address.....

City.....Zone.....State.....

**DIXIE WESTERN MANIFOLD CO.**  
Box 364 Los Angeles 43, California

## Famous **BAILEY** **DIESEL SCHOOLS** Now Accepting **CIVILIAN STUDENTS!**

Bailey has a national reputation for "finest training methods." Bailey teaches you fundamentals, plus the practical application of theory in plenty of actual shop work. Bailey is approved by industry. Bailey graduates get the jobs!

Civilian men and boys over 17 who are ambitious to get ahead will act now. Send for FREE catalog. No salesman will call.

**BAILEY TECHNICAL SCHOOLS**  
1656 So. Grand Blvd., St. Louis, Mo.

## LEARN TO WRITE *a Good Hand!*

**FOR BUSINESS AND SOCIAL SUCCESS!**

Improve your handwriting at home quickly with my new instruction books just off the press. Master all the secrets of better penmanship. Simple and easy, fully illustrated, highly endorsed. Begin today. Write for: ☐ New Free Book, "How to Become a Good Penman", or check books wanted, \$1.00 each. ☐ Business Writing ☐ Artistic Writing ☐ Card Writing ☐ Engrossing Alphabets ☐ Bird and Design Flourishing ☐ Complete Set \$4.50 ☐ Enclose 10c for your name beautifully written and shading penpoint. S. A. Ziller, President, **TAMBLYN SCHOOL OF PENMANSHIP** 439 Ridge Bldg. In Business Over 52 Years Kansas City, Mo., U.S.A.

## SHORTHAND in 6 Weeks at Home

Famous Speedwriting system. No signs; no symbols, no machines; uses ABC's. Easy to learn; easy to write and transcribe. Fast preparation for a job. Surprisingly low cost. 100,000 taught by mail. Used in leading offices and Civil Service. Write for free booklet. Speedwriting, Dept. 2607-8, 55 W. 42 St., N. Y. 18, N. Y.

## LEARN MEAT CUTTING At Home—In Spare Time



Get into the vital meat industry. Concise, practical Home Training based on 25 years proven instruction methods used at National's famous resident school. Prepares you for bigger pay as Meat Cutter, supervision, market manager or more money in your own store. Go as rapidly as your spare time permits. Diploma. Start NOW to turn your spare hours into money. Send for FREE bulletin today. No obligation.

National School of Meat Cutting Inc., Div. 0-68, Toledo 4, Ohio

## Photography for



**PLEASURE or PROFIT**

Learn at home. Spare time. Practical basic training. Long-established school. Many have earned while learning. Send coupon below for free booklet, "Opportunities in Modern Photography" and full particulars.

**AMERICAN SCHOOL OF PHOTOGRAPHY**

1315 Michigan Avenue Dept. 136B Chicago 5, Illinois  
Send booklet, "Opportunities in Modern Photography," full particulars and requirements. No salesman will call.

Name.....Age.....

Address.....

City.....Zone.....State.....





# GET INTO DRAFTING

The Draftsman Plays a most Important Part in INDUSTRY

## DRAWING OUTFIT INCLUDED with Drafting courses.

All the tools you need including folding drawing table. With them you can put your ideas on paper quickly and with accuracy. With training you are all set to master Drafting in months, —not years—at home.

### Learn in Spare Time—At Home! (or at the College in Chicago)

A few hours of pleasant home study every week—that's all. With Chicago Tech's help, you train yourself step by step. This tested method—developed over 44 years of C.T.C. progress—prepares men for good positions in industry.



**CHICAGO  
TECHNICAL COLLEGE**  
H-225 Tech Building, 2000 South Michigan Ave.  
Chicago 16, Illinois

Practically everything that's built or manufactured these days is constructed from blue print drawings prepared by the draftsman. He is the KEY man in industry. No new machines can be built, no bridges erected, no buildings constructed until the draftsman has completed his work.

Drafting is clean, interesting, professional-type work. The draftsman is paid well to start. And he has real opportunities for advancement to high-pay jobs in Engineering. The tremendous production programs ahead in industry will require more draftsmen than ever before.

Send today for free information. See what this training has done for others, what it can do for you. Simply MAIL COUPON TODAY in an envelope or use a penny postcard.

## MAIL COUPON NOW

### CHICAGO TECHNICAL COLLEGE

H-225 Tech Bldg., 2000 So. Michigan Ave., Chicago 16, Ill.  
Mail me FREE Drafting Lesson with information about big opportunities in DRAFTING and how I can train at home.

☐ Architectural Drafting ☐ Electrical Drafting  
☐ Machine Drafting ☐ Structural Drafting  
☐ Builders' Course

Name..... Age.....

Address.....

City..... Zone... State.....

## Now for EVERY WORK SHOP! NEW Invention Electroplates by BRUSH

### Easy to Plate CHROMIUM GOLD, SILVER, NICKEL, COPPER ... For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc. with a durable, sparkling coat of metal... Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. By doing a bit of work for others, your machine can pay for itself within a week. So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE! Mail Coupon.

**WARNER ELECTRIC CO., DEPT. T-13**  
1512 Jarvis Avenue, Chicago 26, Ill.

## FREE Details & Sample!

**WARNER ELECTRIC CO., 1512 Jarvis Avenue, Chicago 26, Dept. T-13**

Gentlemen: Send Free Sample and Details to:

Name.....

Address.....

City..... State.....

## Now Any AUTO REPAIR JOB CAN BE A "Push-Over" for You!

in LESS Time with LESS work

YOU can laugh at auto repair problems when you've got MoTor's New AUTO REPAIR MANUAL! Covers every job on every car built from 1935 to 1948!—from carburetor to clutch—quickly, easily. Simply look up make, model, job, clear, illustrated instructions. This remarkable 1948 Edition contains all facts you'll ever need from Auto Mfrs' Own Shop Manuals.

Over 700 big 8½" x 11" pages—more than 200,000 service, repair, adjustment, replacement, tune-up facts. Over 1700 cut-away pictures, diagrams show exactly WHAT to do, HOW to do it. Used by U. S. Army, tech schools, auto servicemen.

### SEND NO MONEY

Book sent on FREE TRIAL. If not completely convinced that it's the answer to every problem, return it in 7 days, pay nothing. Otherwise send only \$1 (plus 35c postage); then \$2 monthly for 2 months; 95c one month later. Write us TODAY! MoTor Book Dept., Desk 2H, 572 Madison Ave., New York 22, N. Y.

FREE  
7-DAY  
TRIAL

**MOTOR'S  
AUTO  
REPAIR  
MANUAL**

Solves EVERY Job  
On EVERY Car Built from  
1935 to 1948!

Covers all 32 car makes, all 653 models; including Crosleys, Kaisers and Frazers, Jeeps! Over 200 charts, tables: Valve Measurements; Engine Clearances; Generator; Body Service; Dash Gauges; Brake Specifications; Electric, Fuel, Cooling, Lubricating Systems; Transmissions; Universals; Rear Ends, and much more!



SEE IT! RIDE IT! BUY IT!

# The '48 Whizzer Bike Motor

New Twist-Grip controls . . . Carter carburetor  
 . . . new steel cable core notched V-belt drive . . .  
 new ignition . . . chrome trim, 2½ h.p. 4-cycle  
 engine . . . 125 miles per gal., 35 m.p.h.

It's Wise To Go

## WHIZZER

Ride 5 Miles for a Penny!



Still Only  
**\$97.55**

PLUS TAX  
 F. O. B. Pontiac, Mich.

See Your Whizzer Dealer Today . . . or write Whizzer Motor Co.,  
 Pontiac, Mich. For 10 years—world's largest bike motor builder.

# X-acto

## HANDICRAFT KNIVES & TOOLS



Choice of experts in  
 every art and craft  
 field. A blade for every  
 purpose—quickly inter-  
 changeable. Singly and  
 in sets, 50¢ to \$50.00.  
 (Slightly higher in Canada.)

Buy where you see this sign—  
 At hobby, hardware, gift and dept. stores.

X-acto Crescent Products Co., Inc., N. Y.  
 In Canada, Handicraft Tools, Ltd., Toronto

\*Reg. U.S. Pat. Off.

# STUDY AT HOME

With An Educational Institution

Men with specialized training win higher positions, insure  
 larger earnings, and are bigger successes in business and  
 public life. Opportunities NOW greater than ever before.  
 Send for our Catalog.

## ARTS and SCIENCES

Courses in Philosophy; Education; Letters; Public Health;  
 Medical Jurisprudence; Psychology; Sociology; Physics;  
 Chemistry; Plastics; Geology; Political Science; Theology;  
 Business and Commerce; Accounting; Mathematics; Sta-  
 tistics; Agriculture.

## ENGINEERING

Courses in Electrical, Civil, Mechanical, Drafting, Archi-  
 tectural, Steam, Aeronautical, Radio, Structural, Mining,  
 Industrial, Petroleum, Marine, Chemical, Diesel, Autom-  
 obile, Refrigeration, and Air Conditioning Engineering.

## LAW

Complete Professional Law Course includes 18 Hornbrook  
 Series college grade textbooks. Courses also in Commercial  
 Law, Patent Law and Medical Jurisprudence.  
 McKinley-Roosevelt Incorporated, 4610-AB, Sheridan Rd., Chicago 40, Ill.



## Learn Profitable Profession in 90 days at Home

**MEN AND WOMEN, 18 TO 50**—Many Swedish  
 Massage graduates make \$50, \$75 or even more per  
 week. Large full time incomes from doctors, hospitals,  
 sanatoriums, clubs or private practice. Others make  
 good money in spare time. You can win inde-  
 pendence and prepare for future security by  
 training at home and qualifying for Diploma.  
 Anatomy Charts and 32-page Illustrated Book  
 FREE—Now! The College of Swedish Mas-  
 sage, Dept. 870H, 100 E. Ohio St., Chicago 11, Ill.

## RESORT OPERATION AND MANAGEMENT



Your front Opportunity is today's growing  
 demand for more Outdoor Life and Recrea-  
 tion. Ride this opportunity by establishing  
 your own Resort. Book "tells how" based  
 on years of experience. Covers many prob-  
 lems, management, operation, planning, etc.  
 One hundred pages. \$2.00 copy postpaid.

**WOODBEEK PUBLISHING CO.**  
 WINCHESTER BLDG. GRAND RAPIDS, MICH.

## Learn BAKING At Home

Baking is one of America's high industries in wages.  
 Nearly depression-proof. Thorough basic home course  
 lays sound foundation. If you have aptitude, write for  
 FREE BOOKLET, "Opportunities in Commercial Baking."

National Baking School, 1315 Michigan, Dept. 136B Chicago 5



**AGENTS**  
**300% Profit**

## SIGN LETTERS

For Store Fronts and Office Windows. Anyone can put  
 them on. Free Samples. Liberal Offer to general agents.  
**METALLIC LETTER CO., 441 N. Clark, Chicago 10**

## If Ruptured



Do What Others Now Do—  
**Wear a Form Fitting  
 MILLER Truss**

which provides natural free-  
 dom and comfort in working,  
 walking, playing, horse back  
 riding, dancing, swimming or  
 sleeping. You just cannot af-  
 ford to be without this protec-  
 tion and convenience.

**Wear two weeks** then con-  
 sult your physician before de-  
 ciding to keep it.

Write me today for **FREE**  
 descriptive circular. Sent in plain, sealed envelope.

**FRED B. MILLER Manufacturer**  
 Dept. P.S. Hagerstown, Maryland.



# LEARN **DIESEL** THE QUICK, EASY WAY



## THE FAMOUS HEMPHILL WAY!

Wherever Diesels are used, the name "HEMPHILL" is famous. It stands for TRAINED MEN—men who *know* Diesel. Many trained Diesel graduates of Hemphill Schools are successfully engaged in work where their Diesel training is "paying off." Perhaps they are assembling Caterpillar Tractors, or servicing Cummins powered trucks, or installing and maintaining General Motors Diesels. Perhaps they are working with these and other makes of Diesel engines in trains, ships, drilling rigs, sawmills or construction equipment—but no matter what the Diesel job, Hemphill trained men

have the "know how" to handle it.

Prepare YOURSELF for the great industrial swing to Diesel power which is now here. Get complete details of Hemphill Diesel training now!

**STUDY AT HOME**—Learn Diesel AT HOME in your spare time, without interfering with your present activities. Prepare for a bigger future this quick, easy way. Mail the coupon below for complete details and free literature. Or attend 34 weeks resident classes at schools listed below.

### APPROVED FOR VETERANS

**AUTOMOTIVE TUNE-UP SPECIALIST TRAINING** at Memphis and Los Angeles. Check coupon.

#### RESIDENT SCHOOLS LOCATED AT:

NEW YORK	LOS ANGELES	MEMPHIS
31-28 Queens Blvd.	1601 S. Western Ave.	311 S. Main St.
Long Island 1, N. Y.	Los Angeles 6, Calif.	Memphis 3, Tenn.

34 weeks practical training. If you would prefer to train at one of these three schools, indicate by check on coupon.

**MAIL COUPON NOW!**

### HEMPHILL DIESEL AND AUTOMOTIVE SCHOOLS

Administrative Office: 1601 South Western Ave., Dept. PS-78

Los Angeles 6, California

Gentlemen: Please send me FREE BOOKLET and information on your Diesel Courses. I am interested in Home Study ☐ Resident School ☐ at New York ☐ Memphis ☐ Los Angeles ☐ (Check school desired.) Auto Tune-up ☐ L.A. ☐ Memphis ☐

Name \_\_\_\_\_ Age \_\_\_\_\_  
 Street \_\_\_\_\_ Zone \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_  
 Veteran \_\_\_\_\_ Non-Veteran \_\_\_\_\_

## WHY NOT BE AN EXPERT ACCOUNTANT? YOU CAN!

MORE and more opportunities—that is Accountancy's appeal to ambitious people like YOU! Government, industry, thousands of firms, are needing trained accountants. C. P. A.'s and executive accountants earn \$3,000 to \$10,000 yearly; new conditions are steadily increasing the demand! LaSalle trains you at home in your spare time; among our alumni are over 10 per cent of the C. P. A.'s in United States. Training prepares you for C. P. A. examinations or executive accounting positions. Staff of C. P. A.'s personally supervises every phase of your training. You do not need previous experience, for we start you from the beginning. Numerous new opportunities now waiting in Governmental and industrial lines warrant your considering this subject carefully! So act now—investigate LaSalle Accountancy training's possibilities without delay.

Write today for free 48-page booklet, "Accountancy, the Profession That Pays"

**LASALLE Extension University**  
**A Correspondence Institution**

417 South Dearborn Street  
 DEPT. 783-H CHICAGO 5, ILLINOIS



## DRAW for MONEY... Be an ARTIST!

**Trained Artists are Capable of Earning \$60-\$75 OR MORE A WEEK!**

You can learn to draw at home in your spare time the well-known WSA way. COMMERCIAL ART, DESIGNING, CAR-TOONING—all in ONE complete course. No previous art experience necessary—we teach you step-by-step. Prepare now for a fascinating hobby or profitable career. For 34 years WSA graduates have been making good—WHY NOT YOU?

**VETERANS!**  
 WSA is approved for training under the G. I. Bill

Write today for FREE BOOK, "Art for Pleasure & Profit." It fully describes our correspondence course, instruction service, and commercial opportunities for you. TWO ART OUTFITS and other features included with training.

**WASHINGTON SCHOOL OF ART, Studio 137M**  
 1115—15th St., N.W., Washington 5, D. C.

Please send me full information and your Free Book, "Art for Pleasure and Profit."

Name \_\_\_\_\_ AGE \_\_\_\_\_  
 Street \_\_\_\_\_  
 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_  
☐ I am entitled to training under the G.I. Bill



# REPEL

biting insects **49¢**



Send for **PFLUEGER SHOO FLY** INSECT REPELLENT

Protects (from 6 to 10 hours) against mosquitoes, gnats, chiggers, fleas, biting flies. Colorless, odorless, won't stain skin or clothing. Guaranteed safe. Carry positive protection in handy size 2 oz. bottle. A distinctly new product FRESHLY packed. Will help prevent painful sunburn, users also say that Pflueger SHOO-FLY repels fleas, flies, mosquitoes from valuable dogs, cats and other animals. Will not attack or dissolve nylon or plastic.

Available at Fishing Tackle Dealers or order direct from THE ENTERPRISE MFG. COMPANY, AKRON, OHIO. Dept. P.S.

**PFLUEGER**

(PRONOUNCED "FLEW-GER")

Great Name in Fishing Tackle

Say You Saw  
It In Popular Science

NONE BETTER AT ANY PRICE!

PAINT YOUR  
CAR WITH

**KAR-WIPE** NEW AUTO  
ENAMEL SENSATION

WIPE IT ON!

NO SPRAYING!

NO BRUSHING!

No Lap Marks

No Masking

No  
Streaks

GUARANTEED

2 FULL **\$1.95**  
YEARS

Almost anyone can get high-gloss job that looks like a Professional finish. KAR-WIPE does the trick!

Easy to apply! No brush! No masking! Simply WIPE IT ON

with the applicator that we give you FREE. Get a factory-like finish that's GUA-

RANTEED against chipping, cracking, peeling, fading when simple directions are followed. Dries dust free quickly. In newest colors.

SEND NO MONEY! Order one or more quarts today. Just mail postcard. Pay postman plus C.O.D. upon delivery. Send remittance, save postage.

SEND NO MONEY! ORDER Kar-Wipe TODAY! In Black, Grey, Firey Red, Brewster Green, Washington Blue, Maroon ... \$1.95 per qt.

KAR-WIPE CO., Dept. PS-7, 828 S. 18th St., St. Louis, Mo.

YOU  
CAN DO  
A FACTORY  
LIKE JOB

One Quart Covers Average Car With Two Gleaming Coats. A Glowing Professional Finish!

Not a streaky wax or polish. KAR-WIPE is the new miracle high lustrous auto enamel that is so easy to use. Anyone can do a professional looking job quickly.

Have an **OFFICE of YOUR OWN!**

LEARN NEW PROFITABLE PROFESSION  
At Home in 60 Days, Men & Women, 18 to 70!

Be Your Own Boss and the Boss of Others. Be Respected. Meet Interesting People.



BY MAIL in  
Easy Lessons

Earnings of men and women in this profession run as high as \$5,000-\$15,000 yearly. Others make good money in spare time. Little money needed to start. A business where your earnings begin sooner. Easy to learn. No selling or goods to buy. No experience necessary. A depression-proof business. A course of action to guide you step by step as you earn. All 53 lessons sent at once to use as operating manuals. Easy terms. Diploma. Money-back agreement. Write for FREE BULLETIN.

**FRANKLIN CREDIT SCHOOL**

Dept. 71-G

ROANOKE 7, VIRGINIA

**"YOU ARE UNDER ARREST!"**



Help Bring Crooks to Justice Through Scientific  
**CRIME DETECTION!**

We have taught thousands this exciting, profitable, pleasant profession. Let us teach you in your own home. Learn Finger Printing, Firearms Identification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. Over 800 of all American Bureaus of Identification employ I. A. S. students or graduates. We can prepare you for this fascinating work during spare time. Write today, stating age, for "Blue Book of Crime."

INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 136-B, Chicago 40, Ill.

**LAW**

STUDY AT HOME for Personal Success and LARGER EARNINGS. 39 years expert instruction—over 114,000 students enrolled. LL.B. Degree awarded. All text material furnished. Easy payment plan. Send for FREE BOOK NOW—"Law and Executive Guidance."

**AMERICAN EXTENSION SCHOOL OF LAW**

Dept. 91-PS

646 N. Michigan Ave.

Chicago 11, Ill.



CORRESPONDENCE COURSES IN  
**RADIO and ELECTRICAL ENGINEERING**

Tuition  
**\$25**

**ELECTRICAL ENGINEERING.** Get good grasp of wide electrical field. Modern. Very understandable. Theory made easy. **RADIO ENGINEERING.** Extra fine course in radio, public address, photo-electric work. Trains you to be super-service man, real vacuum tube technician. Tuition ONLY \$25. either course. Deferred payment plan. Servicemen needed badly.

Write for free copies of school catalogs, student magazines, etc.  
**FREE LINCOLN ENGINEERING SCHOOL, Box 931-S-115 LINCOLN, NEBR.**

**STAMMER?**

This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering—successful for 47 years. Benj. N. Bogue, Dept. 4826, Circle Tower, Indianapolis 4, Ind.

GET THIS  
**FREE**  
BOOK!

*Write Like This*

AMAZING DISCOVERY! Corrects poor penmanship in few days—big improvement in three hours. **TEN DAYS TRIAL ALLOWED.** Write C. Ozment, 35-D. St. Louis, Mo. IMMEDIATELY.



**DUAL TAIL PIPE EXTENSION**

Fits all cars—chrome plated

DEEP TONE

produced by 2 1/2 inch outlets

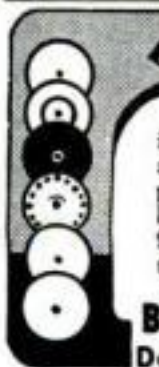
Postage free on prepaid orders

DEALER INQUIRIES INVITED

**\$2.95**

**LYONS PRODUCTS COMPANY**

Pat. Pend. 2319 Ridgeley Drive, Dept. PS-7, Los Angeles 16, Calif.



make your own **Gems** **29.50**  
F.O.B.

All necessary lapidary equipment is furnished, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt, for only \$29.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

**B&I MANUFACTURING CO.**

Dept. M — Burlington, Wis.







## SPECIALIZE In 6 Months to 3 Years COURSES

### SERVICE

6 to 12 Months

- Electricity
- Welding
- Refrigeration
- Heating

### TECHNICIAN

1 to 2 Years

- Electricity
- Radio
- Electronics
- Refrigeration, Heating, and Air Conditioning

### PROFESSIONAL

3 Years

- Electrical Engineering Bachelor of Science Degree
- Major in Machinery or Electronics

# PRACTICAL TECHNICAL TRAINING

Train for a substantial career in industry . . . or a business of your own. Our time-tested Concentric System enables you to build your career step by step. Each 6-month course is complete in itself, yet prepares you for advanced courses. Stay as long as circumstances permit—until you reach the top step in your technical training. More than 1,538 students now enrolled from 48 states and 13 overseas countries. Faculty of 72 specialists. World-wide alumni counselor committee. Terms start Jan., April, July, Sept. **SEND COUPON TODAY!**

## MILWAUKEE SCHOOL OF ENGINEERING

"A Technical Institute—Founded 1903"

Milwaukee School of Engineering  
PS-748, N. Broadway and E. State, Milwaukee, Wis.  
Without obligation, send me free booklet "Career Building" and more details on course

In . . . . .

Name . . . . . Age . . . . .

Address . . . . .

City . . . . . State . . . . .

## ARTISTS MAKE MONEY

Do you like to draw? Send name, address, age and occupation for **FREE ART TEST**, to find out your ability.

**ART INSTRUCTION, INC.**

7148 Art Instruction Bldg., Minneapolis 15, Minn.

## MAGNETS

OF ALL TYPES—10c UP

**AMAZINGLY POWERFUL!!**

4 oz. Alnico Magnet, lifts 10 lbs. \$1.00. Our Leader, 15 oz. Magnet, lifts 40 lbs. \$1.95. New alloy—will not weaken! Useful for lifting valuables from tanks, lakes, or rivers easily! 7 small magnets \$1.00 with list of many shop and home uses. Satisfaction guaranteed.  
**R. L. EYRICH, 2566 N. 49TH ST., MILWAUKEE 10, WIS.**

# BLISS Electrical Training

Intensive 32 weeks' residence course in fundamentals of **industrial electrical engineering**, including radio and electronics. Extensive laboratory, shop work, drafting. Prepares for electrical technician and engineering aides

in communications, power, manufacturing, business machines, sales, service. 54th year. Classes begin July 26, Nov. 22. Catalog. **7612 TAKOMA AVENUE, WASHINGTON 12, D. C.**

## TRAVEL—for 'UNCLE SAM'

### ARE YOU JOB-SATISFIED?

GET A U. S. GOVERNMENT JOB

**MANY POSITIONS TO BE FILLED**

Postoffice Clerks—Mail Carriers—Stenographers—Typists, Statistical Clerks—Storekeeper—Gaugers, etc. 32 Page Civil Service Book—FREE.

**MEN—WOMEN**

**Veterans Get Preference**

Mail Coupon immediately—today sure.

Although not government controlled this can be your first step toward a secure Civil Service Career.

As high as \$3,021  
**FIRST  
YEAR**



### COUPON

**FRANKLIN INST., Dept. D82, Rochester 4, N. Y.**

Gentlemen: Rush to me, without charge, 40 page book with list of U. S. Government big paid positions. Advise me also regarding salaries, hours, work, vacation, etc. Tell me how to qualify for a position.

Name . . . . .

Address . . . . . Vet? . . . . .



# Do you want

- ..to go to College?
- ..or to enter a Profession?

(Such as Accounting, Architecture, Nursing, Dentistry, Teaching, Social Work, Osteopathy, Beauty Culture, Optometry, Embalming, Chiropody, Law, Medicine, etc.)

- ..or get an Office Position?

To get anywhere, you practically **MUST** finish High School **FIRST**. You can complete our simplified High School Course in SPARE time at home, as FAST as your time and abilities permit. Equivalent to resident school work—prepares you for college, pre-professional examinations, business, industry. Standard texts furnished. Diploma. Credit for H.S. subjects already completed. Single subjects if desired. Low tuition, easy terms. American School, Chicago, est. 1897—endorsed by educators. Finish your high school education NOW. Write TODAY!

## High School Course at Home

Many Finish in 2 Years

American School, Dept. HB46, Drexel Ave. at 58th St., Chicago 37

Gentlemen: Send me FREE information covering special training in subjects checked below. No obligation on my part.

- |  |  |
|--|--|
| <input type="checkbox"/> High School Course          | <input type="checkbox"/> Diesel Engineering                    |
| <input type="checkbox"/> Electronics, Industrial     | <input type="checkbox"/> Drafting and Design for Men and Women |
| <input type="checkbox"/> Architecture and Building   | <input type="checkbox"/> Plastics                              |
| <input type="checkbox"/> Automotive Engineering      | <input type="checkbox"/> Private Secretary                     |
| <input type="checkbox"/> Business Management         | <input type="checkbox"/> Mechanical Engineering                |
| <input type="checkbox"/> Electrical Engineering      | <input type="checkbox"/> Aviation                              |
| <input type="checkbox"/> Elec. and Gas Refrigeration | <input type="checkbox"/> Salesmanship                          |
| <input type="checkbox"/> Air Conditioning            | <input type="checkbox"/> Radio                                 |
| <input type="checkbox"/> Railway Training            |  |

Name.....

Address.....

## RADIO

ENGINEERING Television, FM, Broadcasting, Servicing, Electronics, Aviation, Marine & Police Radio taught thoroughly. 72 weeks' Engineering course equivalent to 3 years' college radio work. Approved Veteran Training. Catalog upon request. Valparaiso Technical Institute, Dept. 503, Valparaiso, Ind.

## Mows and Trims Lawns



In One Simple Easy Operation  
8 1/4 Lbs.

Save Time and Labor with a

### MONTAMOWER

New model. New type metal handle has special device to adjust cutting height. Drive shaft now mounted on free rolling, factory lubricated, sealed ball bearings. No tired backs or aching arms. 8 1/4 lbs. live precision made mechanism that first gathers, then cuts smoothly a clean 16" swath through grass, dandelions, spike grass, lawn weeds. No noise or clatter. As modern and efficient as your electric razor. Cuts right up to walls, fences, trees or posts; leaves no fringes to be trimmed by hand. Cutters self-sharpening. Built to last many years. Many thousands in use. Sold direct from factory for 26 years. Costs little. Write at once for trial on your own lawn "approval offer," guarantee information and literature.

### MONTAMOWER DISTRIBUTING CO.

830 Keeler Bldg.

GRAND RAPIDS 2, MICHIGAN

## Be A MASTER PLUMBER

Earn \$15 To \$50 A Day

DON'T ENVY THE PLUMBER—BE ONE

Every skilled workman will tell you that Plumbers have the best of it. WINTER and SUMMER the Plumber is busy at top wages. No skilled Plumber is ever out of a job—compare his opportunities with any trade, plus the opportunities of having your own shop. We teach you Plumbing with TOOLS (not books) under Licensed Master PLUMBERS in one of the finest equipped schools in America. We make you a Plumber, every branch is taught thoroughly—Lead Work—Blueprint for plan reading—all other tricks.

### LEARN IN 32 WEEKS WITHOUT PREVIOUS EXPERIENCE

If you like to work with tools you owe it to yourself to investigate. No need to ever work as an apprentice. Get free bulletin. Write now! G.I. APPROVED. Our 24th year.

UNIVERSAL PLUMBING SCHOOL  
819 HOLMES STREET KANSAS CITY, MO.

## LAW FREE BOOK



Write today for FREE 48-page book, "THE LAW-TRAINED MAN," which shows how to learn law easily in spare time at home through the Blackstone course prepared by 60 well-known law authorities. We furnish all material including 18-volume Modern American Law library. Many successful attorneys among our graduates. LL.B. degree. Moderate cost; easy terms; Money-Back Agreement.

### BLACKSTONE COLLEGE OF LAW

225 N. Michigan Ave., Dept. 120-B, Chicago 1, Ill.  
A Correspondence Institution Founded in 1890

## ENGINEERING DEGREE IN 27 MONTHS

### INDIANA TECHNICAL COLLEGE

Aeronautical, Chemical, Civil, Electrical, Mechanical, and Radio Engineering (inc. television). Drafting. 1-yr. Gov't approved for G.I.'s. Low rate. Earn board. Large industrial center. Students from 48 states, 18 countries. Demand for graduates. Enter Sept., Dec., March, June. Catalog.

678 E. Washington Blvd., Ft. Wayne 2, Ind.



### TALK-SING thru your own radio with RADIO MICROPHONE

Be the life of the party. Put on your own broadcasts at home. Talk-Sing, make announcements from any room. Wonderful voice practice. Microphone easily attached to any radio. Follow enclosed instructions. SEND NO MONEY—pay Postman \$2.25 plus postage. Send Money Order or check and save postage.



EMPIRE RADIO & TELEVISION CO. (Dept. S.I.) 1521 Bedford Ave., Brooklyn 16, N. Y.

## TENTS

Small & large, new & used. Army surplus. Also canvas covers, hammocks, canvas cots, clothing, paints. Lowest prices. Free circular.

MORSAN SALES

10-15P 50th Ave. Long Island City 1, N. Y.



### Thrilling Work COLORING PHOTOS

Fascinating vocation learned at home by those with aptitude. Thrilling pastime. National method brings out life-like colors. Free booklet.

NATIONAL PHOTO COLORING SCHOOL  
1315 S. Michigan, Dept. 136B, Chicago 5

## 3 In 1 AIR PISTOL

SPORTSMAN JR.—Sensational, low-priced air pistol. Ruggedly built, full size target gun shoots either standard BBs, pellets or steel darts. Fast, single-action compression chamber. Single shot, silent shooting. Use indoors or outdoors. Modeled after famous target pistol. Economical to operate. Die cast all metal non-slip moulded grip; machined steel chamber and barrel. 8-in. long; 4 1/2-in. deep; full size, weighs 15 oz. EACH \$3.49

Shoots BBs Darts Pellets

Send No Money

We ship C.O.D. JOHNSON SMITH & COMPANY, Dept. B-78, Detroit 7, Michigan



\$3.49



# THESE 5 TRADES ASSURE YOU HIGH PAY • Future Security

- **PLUMBING** Every phase of plumbing Pipe-Cutting and Threading. Lead-Wiping. Rough-in Projects on Installations. Completed Installations of entire plumbing systems. Blueprint reading Estimating
- **DRAFTING** College-level courses in General Machine and Architectural Drafting. with fundamentals in Drafting Mathematics—all under graduate engineers
- **SHOE REPAIRING** From simplest repairs on boots and shoes to the finest details of reconditioning and rebuilding. under expert craftsmen
- **ELECTRICAL** Technical and shop training include Basic Electricity. Residential Wiring. Industrial Wiring General Testing and Trouble Shooting. and Appliance Repair
- **AUTOMOTIVE & TRACTOR** Applied training on latest model automobiles and tractors. including engine overhaul. transmission and differentials. carburetion generator and ignition systems engine tune up. Hydramatic and Vacumatic Transmissions. and general service

## Choose One of these 5 Essential Trades

Our complete courses of thorough training prepare you to go right into the field as a Qualified Tradesman at High Pay in only 34 weeks (39 in Shoe Repair). All courses under especially trained instructors with practical experience. 6 Hour Classes 5 Days a Week. Our Employment Department helps you.

**VETERANS** "Approved for veterans' training by the State Department of Education under Public Law 346." "Approved for veterans' training by the Veterans Administration under Law 16."

Send Coupon for Free Information Now

"There's Always a Demand for the Man who KNOWS!"

## CHOOSE ONE OF THESE 5 LEADING TRADES

Get Out of that Rut.. Be a Skilled Tradesman! Have a Lifetime Career.. Own Your Own Business and Be Secure in Your Old Age

**NOW** while Enrollment is still open, send for FREE information.

## THE 5 DIVISIONS OF

## NATIONAL TRADE SCHOOL

Dept. C 2610 Grand, Kansas City 8, Mo.

- |   |                                     |
|---|-------------------------------------|
| <input type="checkbox"/> Plumbing             | <input type="checkbox"/> Drafting   |
| <input type="checkbox"/> Shoe Repairing       | <input type="checkbox"/> Electrical |
| <input type="checkbox"/> Automotive & Tractor |                                     |

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

VETERAN \_\_\_\_\_

OCCUPATION \_\_\_\_\_

## PULVEX FLEA POWDER

### TWO KINDS

#### WITH 5% DDT

... for dogs. Kills fleas and lice quick. Keeps fleas off 5-7 days. Many home uses.

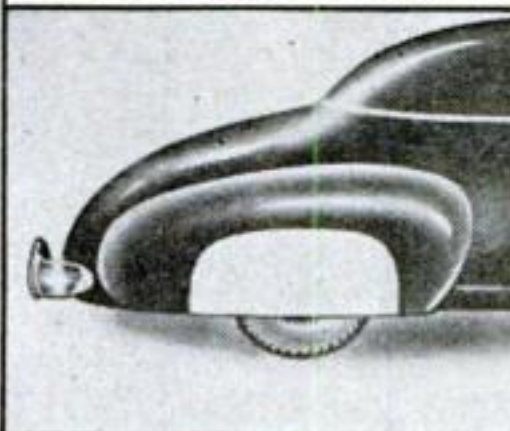
#### OR WITH ROTENONE

... for cats, dogs. Quickly kills fleas, lice. Kills fleas when put on a single spot. Pre-war formula.

EITHER KIND: 25c & 50c



## FENDER SKIRTS . . . . . \$17.20 PER PAIR



For Ford, Chev., Merc., Plym., DeSoto, Chry., Dodge, Kaiser-Frazer, and Buick. Beautify your car—bring out the flowing lines inherently designed there. Sparkling beauty you'll like. Constructed of heavy gauge body steel, finished in prime, perfect fit

SANDEE MUFFLER CO  
Box 296, La Tijera Sta.,  
Los Angeles 43, Calif

Gentlemen: Please send me one set of Sandee Fender Skirts to fit my.....

..... (year and make of car)

☐ Check for \$17.20 enclosed  
☐ Ship C.O.D.

## Sensational New Electric ① WELDER ② CUTTER!



WELDER UNIT



CUTTER UNIT

Uses 110-115 AC or DC • INSTRUCTIONS INCLUDED  
WELD - BRAZE - CUT - MELT - SOLDER - HEAT TREAT

The WELDRITE combination—tested and proven by countless commercial and amateur users, is now offered direct to you at the amazingly low price of only \$12.00. No Gas—No Gauges—No Spark Lighter needed. Always ready for immediate use—Just plug WELDRITE into 110-115 AC or DC outlet. Uses standard welding and brazing materials available at all welding supply stores. WELDRITE furnished complete with Converter Unit #1 Single Holder with attached Alligator clip, for welding metal up to 3/16" thickness, using up to 3/32" rod, and #2 Double Holder with Copper Coated Dual Carbon Electrodes for Cutting, Brazing, Heat Treating, Soldering, etc. Starting welding materials and instructions included.

Ideal for home workshop. Invaluable for

body and fender shops, garages, repair and machine shops, manufacturers, etc.

**SEND NO MONEY! 5 DAY TRIAL OFFER**  
Order your WELDRITE Electric WELDER-CUTTER C.O.D. today. Pay postman \$12 plus postage charges (wt. 4 lbs.) or send \$12 and we pay postage. Either way, if not satisfied, return WELDRITE in 5 days, and money will be refunded. WELDER HOOD—Approved lens found in hoods costing to \$10—only \$3.95. California orders please add 2½% sales tax.

**CALIFORNIA TECHNICAL PRODUCTS CO.**  
448 So. Hill St., Los Angeles 13, Calif. Dept. B-7

**BOTH only \$12**  
LOWEST PRICE IN HISTORY!



# OPPORTUNITIES AHEAD

## For Men Who are Trained in AUTO BODY & FENDER WORK

Men 18 to 60. Want a future with good pay, perhaps a business of your own later? If you are mechanically inclined, start now to learn to become an auto body mechanic and fender repair man. This fast growing field has great possibilities for trained men with experience. U.E.I. spare time, home-study training combined with actual shop practice gives you sound, basic knowledge of latest, best methods so you may get the experience which may bring you big pay. Capable instructors supervise your studies and actual practice. Course includes acetylene welding, spray painting, use of hand and power tools, etc.

### THOROUGH, RELIABLE TRAINING

U. E. I. has trained men for new opportunity fields since 1927 and many students are now making good. Auto body and fender repairing is one of the best profit-makers in any garage or service station. Little capital required. . . . placement service, or we will show you how to start your own shop. Get the facts FREE, without obligation. Write today.

Training approved  
under G. I. Bill

## UTILITIES ENGINEERING INSTITUTE

### AUTO-CRAFTS DIVISION

2523 Sheffield Ave., Dept. 378-X, Chicago 14, Ill.  
Gentlemen:—YES! I want to get into profitable Auto Body and Fender Repair Work. Please send me FREE FACTS at once.

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone or  
County \_\_\_\_\_ State \_\_\_\_\_

☐ Check here for Special Information if under 17.

## HOW TO CUT RAFTERS

New vest pocket book gives lengths, side cuts, plumb cuts, deductions. For all rafters for any building from one inch to forty feet wide. Gives numbers to cut on square. Also degrees for same cuts for Radial Saws. All standard pitches from 1/4 to 5/8. Just open book to pitch page and there are your lengths, side cuts, etc. Anyone who knows what a jack rafter is can frame a roof if he has this great book. Price one dollar, (\$1.25 in Canada). Builders' Topics, Dept. S, Lock Box 828, Seattle, Washington. CARPENTERS, PLUMBERS, PLASTERERS, ELECTRICIANS, ETC. subscribe for Builders' Topics, the monthly magazine for HE-MAN CONSTRUCTION WORKERS. Only \$1.00 per year. (In Canada—\$1.25). Sample copies 25c.

## OWN a Business



Clean and Mothproof rugs and upholstery "in the home." Patented equipment. No shop needed. Duraclean dealer's gross profits up to \$20 a day on EACH serviceman. These Nationally Advertised services create repeat customers. Easy to learn. Quickly established. Easy terms. Send today for Free Booklet—Full details.

DURACLEAN CO., 18-7 CT., DEERFIELD ILL.

## For Outdoor Pleasure and Transportation Ride a Royal Enfield



Famous English Lightweight  
Motorcycle...takes you anywhere

Royal Enfield's popular Model R. E. has everything—Style, Safety, Economy, Flexibility, 125 c. c. 2-stroke, single cylinder engine; 3-speed gears. Goes 100 miles per gallon of gas! 45 m. p. h. Folder "S" gives you all details. Also 350 c. c. and 500 c. c. models.

Write Today.

Dealer inquiries given prompt attention.

**WHITEHALL DISTRIBUTORS, Inc.**

1385 Commerce Avenue, New York 61, N. Y.

COLOR AT A PRICE YOU CAN AFFORD TO PAY

"PHOT-O-CHROME" 2 1/2 x 3 1/2

"SPARKLING COLOR PRINTS"

50c

Made From Any Ansco, Ektachrome or Kodachrome Transparencies

5 x 7... 2.50 8 x 10... 4.00 (unmounted)

**CLEVELAND COLOR SERVICE**

3974 EAST 131st STREET CLEVELAND 5, OHIO



Pat. applied for

**J. C. MOORE INDUSTRIES**

P.O. Drawer 276  
FREDONIA, PA.

Start a NEW BUSINESS  
Or Add to Your Present  
Repair Business  
Sharpen Dull Pipe Wrenches  
Pipe Taps & Dies  
"Gum" Circular Saws

Write for information.



## RAISE Money Making CHINCHILLAS

Several females and a male start a large herd which will furnish you an income for years. Just a few feet of space are required. No experience needed. We furnish all instructions. Write world's largest breeder today for free details.

WILLOW BROOK FARM, R16A, Sellersville, Pa.

Say You Saw  
It In Popular Science

## Be a DETECTIVE

Learn at Home In Your Spare Time

Be your own boss! Earn good money in this interesting, respected profession. This is a recognized, authoritative course of training. Includes crime detection, prevention and identification; shadowing, undercover work, etc. Write for FREE BOOK describing training and opportunities. State Age.



INTERNATIONAL DETECTIVE TRAINING SCHOOL  
1701 Monroe St., N. E. Dept. 217A Washington 18, D. C.

## WAR SURPLUS VALUES

### NAVY T-SHIRT

Brand New. First quality. Soft fine knit cotton. Sizes small, med., large.

3 for \$2



### PUP TENT



Army surplus. Full size. Used—guaranteed perfect condition. Complete with poles and pins.

3 95

### SLEEPING BAG

100% wool, mummy type. 30" zipper. Reissue—guaranteed like new. Complete with water repellent cover.

3 95

### Jungle HAMMOCK

Brand New. Mosquito proof. rain-proof. mildew-proof. nylon. Use as hammock or tent.

5 95

Full length zipper opening



### Air Corps SUNGLASSES

New Air Corps Type. 24 Karat gold plated frame. 4 base optically ground lens. Pearloid brow rest. Complete with case.

2 25

### NAVY KNIFE



Laminated leather grip handle. Complete with sheath.

98c

ORDER FROM THIS AD

Send No Money Pay Postman Purchase Price Plus Postage. Sent Postpaid If Money With Order

**NATIONAL JOBBING COMPANY**

1703 No. 24th St. Dept. S-7 Omaha, Nebr.



## Original HOLLYWOOD WOLF WHISTLE

CAR HORN

Give the  
WOLF CALL



\$4.00



You, too, can become a Hollywood Wolf. Give the wolf call and make other weird noises with the original HOLLYWOOD WOLF WHISTLE on your car. Precision made. Works off the intake manifold. Easily installed in 15 minutes.

Works in trucks, motorcycles, motor boats, outboard motors, too. Guaranteed. If your dealer cannot yet supply you, order direct, giving us your dealer's name. No COD's or stamps. No individual foreign orders. AUTOMOTIVE DEALERS & JOBBERS write for information on this fast selling, proved item.

**YODER MFG. COMPANY**

2403-41GEast103rdSt., Los Angeles 2, California

DESCRIPTIVE  
LITERATURE  
ON  
REQUEST

## ENORMOUS PROFITS CASTING AT HOME

Write today for NEW FREE CATALOG

Learn to cast thousands of perfect figurines, plaques, book ends, ash trays, etc. Start NOW—NO EXPERIENCE, LITTLE CAPITAL needed. Earn GREAT PROFITS with X.L. RUBBER MOLDS. X.L. Rubber, Pts. \$2.00; Qts. \$3.50; Gallons \$8.95; Models and enough rubber for 3 molds . . . \$1.00—Foreign \$1.50.

PLASTIC ARTS STUDIO

Route 2, Dept. 3  
MUNCIE, IND.



FREE  
FACTS  
SENT

## AMBITIOUS MEN

• You May Now Have An Office In New York Requiring No Room or Box Number, For As little as \$12.00 per year

If you have a business service, or merchandise to sell, or an idea, or patent to offer, and want results, just advertise it under your name, and use our office, as your own. That is all.

CO-OPERATIVE OFFICE SERVICE

PS-126 Lexington Avenue

New York 16

Say You Saw  
It In Popular Science

## PRECISION JEWELERS SCREW DRIVERS

Complete Set of 8 for Every "Hobbyist"



At last—a complete set of precision screw drivers to meet the needs of every model builder. Not a miniature but the same type set used by U. S. Navy for precision instruments and watches during the war. Brass knurled handles, hexagon heads, finest tempered steel blades. Sizes 2-9. Never before a set of this quality and precision at such a low price. Your money back if not satisfied. C.O.D. \$2.00 plus postage or send \$2.00 and we pay postage.

PINE WATCH CO., Rm. 40, 29 Eldridge St., New York 2, N. Y.

TRAIN NOW FOR AN

## AVIATION CAREER

IN SUNNY SOUTHERN CALIFORNIA

### MAXIMUM TRAINING IN MINIMUM TIME

Specializing in AERONAUTICAL ENGINEERING and MASTER AVIATION MECHANICS since 1929 . . . America's Finest Aeronautical Institute . . . 7000 successful graduates . . . MAKE MORE MONEY . . . MAIL COUPON TODAY. APPROVED FOR VETERANS. Board and Room now available.

Without obligation, send free catalogue with full information.

NAME \_\_\_\_\_ AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

**CAL-AERO TECHNICAL INSTITUTE**

GRAND CENTRAL AIR TERMINAL • GLENDALE 1, CALIFORNIA



PS-7

## Get into BUSINESS for Yourself!

### METALIZING BABY SHOES AT HOME IN SPARE TIME



Get facts now about amazing money-making Warner Success Plan that shows you every easy step in completely charted path to personal independence—with your home as your headquarters . . . This proved and tested Plan is working like magic. It's backed by an old, reliable company . . . And we send it to you on a No-Risk Trial Money Back Guarantee.

### QUICK CASH WAITING

Demand for METALIZED Baby Shoes and other keepsakes is growing bigger daily. Our Tested Plan Shows How to Do the Work, How to Bring in the Business, How to Make as much as \$5 an Hour. Spare or full time, big steady profits are waiting for you. Send penny postcard or mail coupon for FREE Facts. Act! Time is precious.

**FREE**  
offer of  
**COMPLETE**  
**MONEY**  
**MAKING**  
**PLAN**  
•  
**SEND NO**  
**MONEY**  
Just Mail  
**COUPON**

Ray Brandell, Mgr., Warner Electric Co.,  
1512 JARVIS AVE., DEPT. 27, CHICAGO 26, ILL.

Please rush complete details about your No-Risk Trial Money Back Plan for Metalizing Baby Shoes. Everything you send is FREE and costs me nothing—now or ever.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

## Here's BIG MONEY FOR YOU

I WILL  
SEND YOU THIS  
AMAZING  
ELECTRONIC  
KIT!



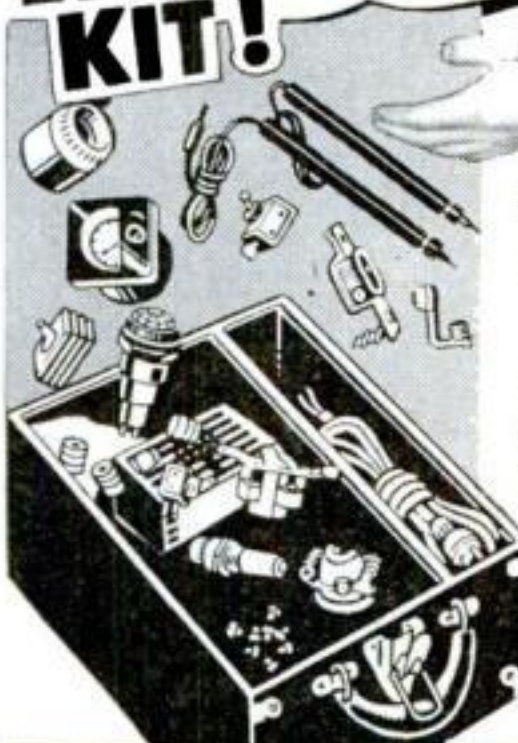
S. T. CHRISTENSEN

### Checks-Tests

Electrical Household Appliances, Factory Equipment. A sure fire trouble detector!

### LEARN APPLIANCE REPAIRING

Do as other trained mechanically inclined men do . . . charge on basis of \$5.00 to \$6.00 an hour! Repair electrical appliances, equipment. Get full facts today how I've trained thousands in their own homes. Write



Mr. S. T. Christensen, PRESIDENT  
**CHRISTY SUPPLY CO., Dept. D-6701**  
2835 N. Central Ave., Chicago 34, Ill.



## Amazing FOUNTAIN PEN GUN



**Shoots Tear Gas 15 Feet**

**Fits Pocket or Purse...  
Guaranteed  
to stop man  
or beast**

**Complete Protection  
With Just a Flick  
of Your Finger**

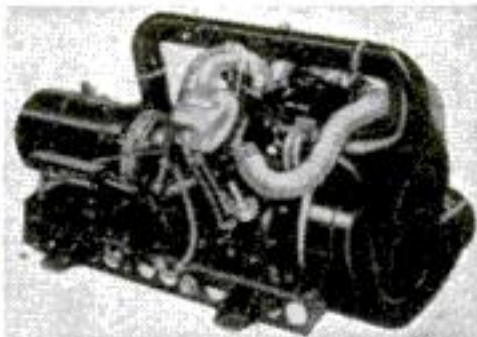
Here's quick, easy "finger-tip" protection. Shaped like a regular fountain pen, this pistol pen throws a powerful charge of tear gas 15 FEET! Cloud of gas spreads 4 to 6 feet. You can't miss. Just point pen like you point finger and release trigger. Ideal for home, office or car. May be clipped in pocket like pen. Loads like gun. Fires 38 Caliber S. & W. "Special" TEAR GAS cartridge. Will not kill. Renders mad dogs, robbers, etc., helpless. Can not harm user. Effective indoors or out. NOT SOLD TO MINORS or persons residing in state prohibiting sale of firearms. ONLY \$7.50. Cartridges 5 for \$2.50. Order TODAY!

**SEND NO MONEY** Just send name and address. Specify Pen. Cartridges or both. On arrival pay cost plus Express Shipping charges. Send cash with order. we pay express charges. Use 10 days. If not delighted return for money back. Order NOW!

**PROTECTO PRODUCTS CO.** Dept. 450, 215 N. Michigan Ave. Chicago 1, Ill.

## 15 H.P. "V" TYPE ENGINES

**TWIN CYLINDER**



Here is power galore for midget racing cars, speed boats, etc., or build your own garden tractor, mower, welding outfit, mill, saw, home lighting plant. Use it for any type of power job. Engines measure 32" long, 22" wide, 18" high. Mounts flat with mounting brackets 14" apart each way.

**FOR SHOP, FARM AND HOME POWER**

Precision built—orig. acquisition cost many times our asking price. Famous "J" motor with 31.91 cu. in. displacement. Full 2 3/4" bore, 2 11/16" stroke. Dual carburetion with shielded ignition and fuel system. Removable governor included. Each motor is fitted with 28.5 volt. generator (removable) ideal for welding outfits.

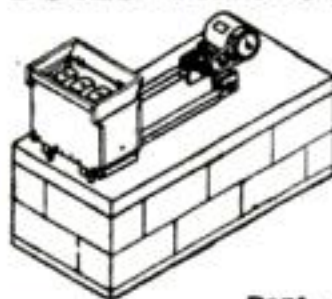
**A RARE BARGAIN AT THIS LOW PRICE**

These are built to run like a Rolls-Royce. Some slightly used—some like brand new. Guaranteed as described or your money back. Your cost, each, only \$119.00—two or more, \$110.00 each while they last. Send check or money order. You've seen our ads since 1941.

**FEDERAL IDENTIFICATION CO.**

1910 CLASSEN BLVD., Dept. B OKLAHOMA CITY, OKLA.

## BUILD THIS CONCRETE BLOCK MACHINE



Sell blocks; or build your home, garage, barn, or filling station at 1/3 cost by making and laying your own blocks.

This simple machine which you can build yourself at a cost of \$15 (excluding motor) will make a block in 30 seconds using only one form. Mass production can be achieved by a new simple method of removing blocks which allows two to four forms to one vibrator. Power driven concrete mixer plans also. Send dime for details and "How to Make and Lay Blocks" folder.

**U-BUILD-IT SERVICE**

Dept. 4-A, 206 West Wilder St., Tampa 3, Florida

## APTITUDE TESTS

discover the kind of work or studies best for your success!

You get a personal report—a guide for life—more happiness—more prosperity. (for men, women, boys, girls.) Write for complete facts

**VOCATIONAL COUNSELING INSTITUTE**

5057 Woodward Ave., Detroit 2, Michigan

## YOU CAN BE AN ELECTROPLATER



Be your own boss or work for big pay. Make money while you learn at home in spare time. Interesting, uncrowded field. Plate with chrome, nickel, silver, gold, etc. Money making trade secrets furnished. Send postcard for **FREE** idea booklet today!

**HYDE SCHOOL OF ELECTROPLATING**

432 F Street, Room 522, San Diego 1, California

## MECHANICAL DENTISTRY



A profession offering unlimited opportunities. Most modern and complete course embracing every branch from Plate to Porcelain Work, which prepares you to work for Dentists or start your own business. Individual instruction—practical training in day or night school. No books—no classes. Catalog upon request.

**McCARRIE SCHOOL of Mechanical Dentistry**, 207 N. Broad St., Dept. 876, Philadelphia, Pa.

## Now She Shops "Cash And Carry"

**Without Painful Backache**

Many sufferers relieve nagging backache quickly, once they discover that the real cause of their trouble may be tired kidneys.

The kidneys are Nature's chief way of taking the excess acids and waste out of the blood. They help most people pass about 3 pints a day.

When disorder of kidney function permits poisonous matter to remain in your blood, it may cause nagging backache, rheumatic pains, leg pains, loss of pep and energy, getting up nights, swelling, puffiness under the eyes, headaches and dizziness.

Don't wait! Ask your druggist for Doan's Pills, a stimulant diuretic, used successfully by millions for over 50 years. Doan's give happy relief and will help the 15 miles of kidney tubes flush out poisonous waste from your blood. Get Doan's Pills.

## LOCKSMITHING & Key Making



**PRACTICAL UP-TO-DATE COURSE**

Easy-to-learn modern information for self-instruction. How to work on locks, pick locks, de-code, make master-keys, repair, install, service, etc. For every handyman, home owner, carpenter, mechanic, service station operator, fix-it shop, hardware dealer, gunsmith. 53 plain illustrated lessons. Full price only \$3.95. **SEND NO MONEY.** Just pay postman plus C.O.D. postage. Or send \$3.95 with order, we'll ship postpaid. Satisfaction guaranteed or refund. Address below.



**WATCH & CLOCK REPAIRING**

Learn at Home in Your Spare Time! . . . Prepare for a happy future, with security—and qualify for a good job NOW. A fascinating and thorough self-instruction training in American and Swiss watches and clocks. Special section on alarm clock repairs. Fast-growing field. Satisfaction is guaranteed. Full price only \$4.95, postpaid—or C.O.D. plus postage.

**Nelson-Hall Co., 1139 S. Wabash Ave., Dept. G-01, Chicago 5, Ill.**

- ★ WRIST WATCH
- ★ STOP WATCH
- ★ TELEMETER
- ★ TACHOMETER

**Phenomenal Value!**

**17 JEWEL • 2 PUSH BUTTON**

**CHRONOGRAPH**

ONLY **\$29.75** PLUS 10% TAX

**INCABLOC SHOCK RESISTANT FEATURE**

- Sweep Second Hand
- Radium Dial • Anti-Magnetic • Unbreakable Crystal. (formerly \$71.50)

**IDEAL FOR**

- Physicians • Engineers
- Radio Men • Sportsmen
- Photographers • Aviators

**OUR GUARANTEE**

**MONEY BACK IN 10 DAYS**

If not satisfied for any reason

**ADLEW JEWELERS**

Dept. PS-7

117 W. 42nd St., N. Y. C. 18

Mail Orders Promptly Filled • Shipped

C. O. D. or send check or money order.

Address mail-orders to: **ADLEW JEWELERS** (Dept. PS-7), 152 West 42nd St., N.Y.C. 18.

Also available in 18-k Gold Case. \$64.50 (plus 10% tax), formerly \$125.





# Learn BUILDING

AT HOME • All Blue Print Building Plans, Specifications, Lessons Furnished

Earn more money as a building tradesman. Prepare for advancement and increased pay as a building foreman, superintendent, inspector, estimator, material buyer or salesman. Train to be a building contractor, have your own money-making business in this busy, prosperous building field.

More than 19 million new homes needed in U.S., say experts. New building now at rate of one million homes a year, plus 200,000 commercial buildings, plus expanding farm building construction.

Mail coupon today. FREE book tells how you learn Building Construction—How to Read Blue Prints, and Estimate Building Costs—at home in your spare time. Learn modern construction methods and materials, how to lay out work and direct all building operations. This is the training needed for rapid advancement to higher-paid jobs, or your own successful building business.

## FIND OUT ABOUT TRAINING AND OPPORTUNITIES FOR YOU IN BUILDING

Established in 1904, Chicago Technical College offers you thorough, practical training in Building, by home-study. Mail coupon for free information. See what this Course has done for others, what it can do for you. Read what Chicago Tech graduates say about their work, earnings, success. Learn the rewards awaiting you as a trained builder—and how quickly, easily you can get started. Simply MAIL COUPON TODAY in an envelope or paste on a penny postcard.



## MAIL COUPON NOW

**CHICAGO TECHNICAL COLLEGE**  
H-158 Tech Bldg., 2000 S. Michigan Ave.,  
Chicago 16, Illinois

Mail me FREE building Lesson with information about big opportunities in BUILDING and how I can train at home.

Name.....Age.....

Address.....

City.....Zone.....State.....

**CHICAGO TECHNICAL COLLEGE**  
H-158, Tech Building, 2000 South Michigan Ave.  
Chicago 16, Illinois

TINYMITE



## MIDGET RADIO!

FITS IN YOUR HAND! ONLY 1/4 LB. Beautifully molded red cabinets! No tubes—batteries or electric "plug-ins" needed! Has scale dial—personal phone, new type fixed power crystal diode. One Year Service Guarantee.

**GUARANTEED TO WORK** on local stations if used as directed. **USE MOST ANYWHERE** in bed, hotels, offices, farms, homes, etc.

**SEND ONLY \$1.00** (bill, money order, check) and pay postman \$2.99 plus C.O.D. fees on arrival or send only \$3.99 for postpaid delivery!

Complete—Ready to play—Excellent gifts for boys and girls. ORDER YOUR TINYMITE RADIO TODAY AT THIS BARGAIN PRICE! (Foreign \$5.00 U. S. cash.)

PAKETTE RADIO COMPANY, INC. Dept. TPS-7 KEARNEY, NEBRASKA

## Live in a House?

This light, strong, easily handled device—weight-tested to 500 pounds—will let you Wash—Paint—Putty Your Windows—Hang Screens and Awnings—Service Combination Storm Windows without a Ladder! Protective steel railing—wide substantial floor—rubber house protectors. Model H adjustable to all household wall thicknesses—9" to 17". \$10.50 postpaid. \$9.85 C.O.D. plus fee. Money back guarantee. Patents pending. A Morsafe\* Product. Agents—Dealers—Territories Open. \*Trademark



## THEN YOU NEED A WindoStep\*

FOR ALL OUTSIDE WINDOW WORK  
...UPSTAIRS OR DOWN

An Ideal Gift

**MORRISON CRAFTERS**  
703 Miami Street, Toledo 5, Ohio

NAME .....

ADDRESS .....

CITY.....STATE.....

C.O.D. ☐ PREPAID ☐

PS-7 SEND CIRCULAR ☐



## Learn How to HYPNOTIZE!



**Develop your personal POWER!**  
 NOW... revealed for you... are the secrets of practical hypnotism... that strange, compelling force by which an expert operator can bring others under his power. He can sway people at will—issue commands and be obeyed—virtually cast a spell over his subjects. This sensational knowledge may make you a more dominant, masterful personality.  
**Illustrated SELF-INSTRUCTION COURSE in Useful Hypnotism**  
 Amazing lessons in simple, easy-to-understand language. How to select a subject—how to hypnotize by telephone—how to make money from hypnotism—mental telepathy—stage hypnotism—self-hypnosis—how to use modern hypnotism to conquer inferiority complex, timidity, etc. Clear helpful pictures show operating positions, movements. **Startling low price. Satisfaction guaranteed or money back.**

**COMPLETE ONLY \$1.95**

Full price only \$1.95 postpaid, nothing more to pay. You will be amazed at what practical hypnotism can do for you! Use the no-risk coupon below... and mail it today.  
 Nelson-Hall Co., 1139 S. Wabash Ave., Chicago 5, Ill.

## MENTAL SCIENCE

### AWAKEN YOUR HIDDEN POWERS!

You are a sleeping giant... learn how to release your unused forces. Now ready—practical reading-course in everyday psychology. Teaches you self-mastery, influencing others, getting ahead, etc. Written by 34 psychologists. Low price. Now only \$6.95 (was \$10). Check coupon below for inspection at our risk. You must be 100% satisfied!



## SUPER JU JITSU

Now.. get tough DOUBLE-quick!

Step up YOUR fighting power, learn lightning-quick American SUPER Ju Jitsu. Develop your body... be dangerous! Big illustrated home-study course, reveals secrets on how to make deadly weapons of just your bare hands. Easy to learn. Get these amazing lessons right away... you owe it to yourself. Complete price only \$4.95, nothing more to pay! Mail coupon below with \$4.95 and shipment will be made at once. Satisfaction guaranteed or refund.

## MAIL THIS COUPON TODAY!

NELSON-HALL CO., 1139 S. Wabash Ave., Dept. 2G01, Chicago 5, Ill. Please rush me the items I am checking below. It is understood that if I am not 100% satisfied I will send the material back within 10 days and you will make full immediate refund, without question or quibble.

☐ Hypnotism ..... \$1.95  
☐ Mental Science ..... 6.95  
☐ Super Ju Jitsu ..... 4.95

☐ I enclose \$..... in full payment. Ship postpaid.  
☐ Ship COD for \$..... plus postage and COD charges.

Name.....

Address.....

## BE A SUPERVISOR



**Franklin Technical Institute**  
 Helps Young People Get Ahead

• The door to well-paid supervisory jobs in industry is wide open—to the man or

woman with specialized technical training. 50,000 graduates of this Boston school have gone out to good jobs in engineering and technical fields.

Practical courses in industrial electricity and electronics, industrial chemistry, mechanical and machine design, structural and architectural design, automotive service and management, electric wiring and maintenance. Also preparatory course. Day and evening classes. Approved for veterans. 40th year.

**FRANKLIN TECHNICAL INSTITUTE**  
 39 Berkeley St. Boston, Mass.  
 Please send free information on all courses.

Name..... Age.....

Address.....

City..... State.....



## HY-SCORE

**World's Most Powerful AIR PISTOL**

**ACCURATE! FAST! HARD-HITTING!**... Expensively made piston-type pistol for use by experts. No pumping. 30½ oz. 10¼" long. Cal .177 or .22. \$19.85 for set including Hy-Score Pellets and darts\*. Extra ammunition per box of 500 rounds \$1.49 for Cal .177, \$1.88 for Cal .22.

\*When available.

If your dealer cannot supply, write for free booklet, Dept. PS-7  
**HY-SCORE ARMS CORP., BROOKLYN 1, N. Y.**

Use HY-SCORE Pellets for best air pistol shooting.

## WATCHMAKING

**Be a Watchmaker—Be Independent**

Day and Evening Classes—Approved for Veterans

Write today for free Information

**CHICAGO INSTITUTE OF WATCHMAKING**

7 So. Pulaski Road Dept. PS-7 Chicago, Illinois

## Learn LANDSCAPE GARDENING

A thorough, interesting, home study course for those who wish to become Landscapers, Gardeners, Designers, etc., for profit or pleasure. Write today for **Free Book** to

**APPROVED NATIONAL LANDSCAPE INSTITUTE**  
 FOR VETERANS Dept. PS-7, 310 So. Robertson, Los Angeles 36

**Say You Saw**  
**It In Popular Science**

## CHINESE BOXING and JIU-JITSU BLOWS

Paralyzing-Knockout-Death blows against attack. Learn 32 advanced blows directed against nerve centers of your assailant. No mat work—no gym work—no muscle building—no weight lifting, etc.

Send \$1.00 for this valuable self-explanatory chart.

**S. R. LINCK & ASSOCIATES, 448 So. Hill St., 706A Pershing Sq. Bldg. Los Angeles 13, Calif.**

## MORE POWER FROM YOUR ENGINE WITH PERFECT TIMING



Keep the timing of your car, motorcycle, outboard or boat engine, tractor or any gasoline engine "right on the nose" with this amazing new **TIMERLIGHT**. Easy to use. Attach one clip to engine block, the other to spark plug wire. Flash shows timing. A must for motorists, boat owners, farmers, mechanics. Nothing else like it. Send for yours NOW. Money back guarantee. **DEALERS: Good territory open. Write for details.**

**CONNIE BERT CO., 8115 Clinton Road, Cleveland 9, Ohio** Battery not included.

**PARCEL POST PAID**  
 Only \$1.49

## ★ PSORIASIS ★

**PSORIASIS SUFFERERS:** Has everything failed to bring even temporary relief from scales, lesions and itching? Then write today for **FREE** important information. You needn't invest one cent!

**PIXACOL CO., Dept. S-7, Box 3583, Cleveland, Ohio**

**MICROSCOPES SUPPLIES-ACCESSORIES & SCIENTIFIC INSTRUMENTS**  
 BEL SPENCER NEW USED LEITZ ZEISS  
 BOUGHT-SOLD-EXCHANGED-REPAIRED  
 Send for **FREE LIST**  
**NATIONAL SCIENTIFIC INSTRUMENT CO. 119 CHAMBERS ST.**





SALES ENGINEER

MOLD DESIGNER

RESEARCHER

FABRICATOR

LAMINATOR

PARTS INSPECTOR

MOLDING TECHNICIAN

YOUR OWN BUSINESS

## WHICH CAREER IN PLASTICS DO YOU WANT?

Plastics is one of the fastest growing industries—offering you unusual opportunities for an interesting, successful career and security in the years ahead. Trained men, with plastics know-how will fill the important, well-paying positions. YOU can be one of them. Mail the coupon below for a big, colorful, free catalog on Plastics and complete de-

tails about Plastics Institute, America's oldest and largest plastics school. Resident School located in beautiful Southern California Comprehensive Home Training Courses to prepare you in your spare time at home for a career in plastics. You can enroll immediately! Write Plastics Institute, Dept. PS-78, 1601 S. Western Ave., Los Angeles 6, California.



### LEARN BY DOING

To give you practical experience we supply colorful plastics to make useful, attractive creations. You can also make and sell plastics articles to earn while learning.

APPROVED FOR VETERANS

*Plastics* INDUSTRIES TECHNICAL INSTITUTE  
NEW YORK CHICAGO LOS ANGELES

Plastics Industries Technical Institute  
Dept. PS-78, 1601 S. Western Ave., Los Angeles 6, Calif. Mail in Envelope or  
Gentlemen: Please send me free booklet and information on your Home paste on penny postcard.  
Training Courses ( ) Resident School Courses ( ) I understand there is absolutely no obligation.

Name (PRINT) ..... Occupation .....

Street (PRINT) ..... Age .....

City ..... Zone ..... State .....

VETERAN ☐ NON-VETERAN ☐ Important: Please fill out coupon Completely.

FREE  
BOOKLET



PLASTICS INSTITUTE in the heart of sunny Los Angeles. Here, modern laboratories and shops give Resident School students facilities for practice on the finest of industry-type plastics equipment. Also the headquarters for HOME TRAINING.

## MAIL ORDER *Sale* GENUINE U.S. GOVT. WAR SURPLUS

### FAMILY CAMPING KIT

\$26 Worth of Equipment \$19.95

34 Pieces all for

- 1-COT: U.S. Army, used. Perfect Condition .....\$3.45
- 1-TENT: U.S. Army Pup Tent, NEW, complete .....\$5.89
- 2-FLASHLIGHTS: Army, with Belt Clip. Used, excellent condition. Sturdy, shockproof. Less batteries 79c ea. ....\$1.58
- 2-MESS KITS: Regular G.I., used, excellent cond. 39c ea. ....78c
- 2-SERVICES: Knife, fork, spoon, Army, for mess kit, used, but excellent condition. 49c ea. service .....98c
- WATERPROOF CANS: With belt clip, excellent for matches, cigarettes, etc., small .....12 for 49c
- 2-HUNTING KNIVES: "PAL" U.S. Navy, with sheath, NEW \$1.39 ea. ....\$2.78
- 2-BLANKETS: 100% Australian Wool, reconditioned like new. \$3.49 ea. ....\$6.98
- 2-HELMETS: Used by the G.I.'s. 39c ea. ....78c
- 4-G.I. CANVAS CARRYING BAGS: Perfect, but used. All 39c ea. Pick styles wanted .....\$1.56
- 15' 3/4" Sisal Rope, whipped ends. Just the thing for towing, packing loads, etc. ....75c
- TOTAL .....\$26.02

All quality mdse. The cot, tent and blankets alone are worth full price you pay. And you get balance of outfit without extra cost. Each item may be ordered separately at prices listed. ORDER NOW.



**HYDRAULIC JACKS**  
2-TON CAPACITY  
Adjustable head 7" low \$4.95  
... lifts to 14". Fits all cars. Dozens of other uses.

**APPROVED Life Preserver Jacket**  
Used, but perfect  
Kapok.....98c  
Cork.....\$1.69

**NAVY TYPE WORK SHOES**  
\$5.25  
Rough leather outside.  
All sizes wide widths.  
State size.

**CLIMBING EQUIPMENT**  
Sturdy... Professional  
Linesmen's Safety Belt and Strap. State size....\$5.75  
Pole Climber and Straps....\$4.50

**SATISFACTION GUARANTEED**  
We Ship C.O.D.  
ORDER BY MAIL TODAY  
Prices do not include postage.

**ABELL DISTRIBUTING CO.** Dept. 9  
4633 York Rd., Baltimore 12, Md.

### MINE DETECTOR \$49.50

SCR-625 Mine Detector. Ideal for locating buried metal, pipes, treasure, metallic fragments in lumber. Approx. depth of detection 6 feet, depending on soil conditions. Complete with batteries and tubes. Tested before shipment. Shipping weight 70 lbs.



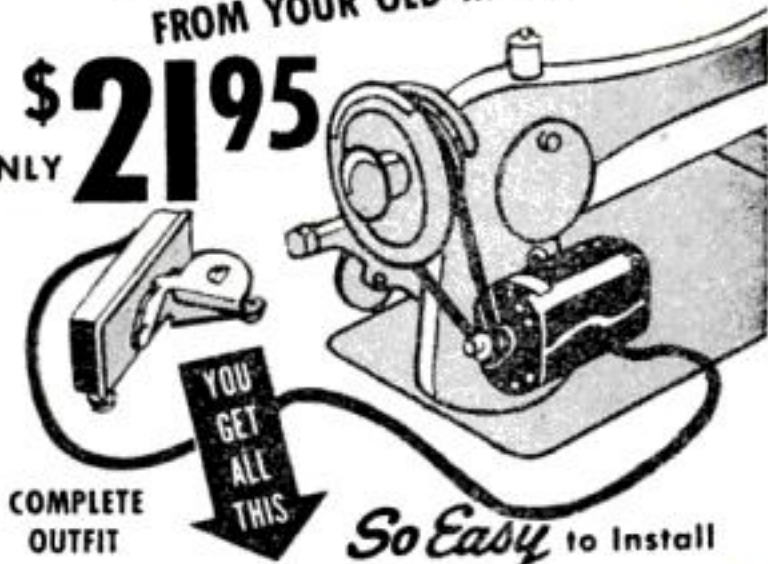
### BARGAIN PRICES ON GAS ENGINE POWER PLANTS

Write for full particulars. 1600 Watts, 115 volts, 17.4 amps @ 80% P.F., 60 cycles, Wisconsin type AEH, air cooled 4 cycle engine. \$199.00  
5000 Watts, 115 volts, 54.8 amps @ 80% P.F., 60 cycle, Onan JWC, 4 cylinder 4 cycle gas engine. \$549.00  
Watercooled.  
All units reconditioned & guaranteed. 20% deposit required on these items, only.



# A MODERN ALL-ELECTRIC SEWING MACHINE FROM YOUR OLD MODEL

ONLY **\$21.95**



Each outfit has: New air-cooled motor. New mounting bracket. New belt pulley. New 6-speed foot-control and clear, easy-to-follow instructions. SATISFACTION GUARANTEED OR MONEY REFUNDED

## FREE OFFER! act now

For prompt action to readers of "Popular Science" this \$3.49 Sew-light free on orders received in 10 days (please date your order). Sew-lights may be purchased separately at \$3.49.



## CLIP THIS COUPON—MAIL TODAY

AMERICAN SEWING MACHINE COMPANY • 943 E. 72 St. • Cleveland 3, Ohio (PSMT)

Send your special outfit at \$21.95. The make of my machine is \_\_\_\_\_

Direction of handwheel: ☐ forward ☐ reverse. Include Sew-light ☐ free ☐ \$3.49

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

ZONE \_\_\_\_\_

STATE \_\_\_\_\_

☐ Check Enclosed

☐ Please ship C.O.D.

Date \_\_\_\_\_



## WHY PAY MORE?

Tube Given With Every Tire

SEND THIS AD WITH ORDER

Slightly used **HIGH ORIGINAL TREADS.** Buy in **CONFIDENCE.** Safe! Dependable! Standard Brands. **GUARANTEED** to give A-1 SERVICE. **Positively Not Re-caps!**

600-16 ....	\$5.75	700-15 ....	\$5.95
650-15 ....	5.15	700-16 ....	6.25
650-16 ....	5.85	750-16 ....	7.25

900-16 ....	8.55	900-20 ...	15.55
650-20 ....	9.55	1000-20 ...	15.55
700-20 ....	12.55	1100-20 ...	15.55
750-20 (H.D.)	12.55	32x6 (8) ...	11.85
825-20 ....	15.55	32x6 (10) ..	13.85

750-20 MILITARY 8 PLY .... \$13.55

½ million tires shipped to satisfied customers. Trial will convince you. Orders Rushed. Send Money Order.

If Your Size is not Listed—WRITE

## STANDARD TIRE

834 N. Broad St.

Phila. 30, PA.

## LEARN AND EARN AT HOME

Learn **SCREEN PROCESS**, the modern machineless method of printing. Uncrowded, profitable field where trained men are always in demand. 2 BIG KITS OF SUPPLIES we send start many of our students making money even before finishing home study course. Write today for FREE BOOK giving full details. APPROVED FOR VETERANS.

California School Of Screen Process, 3740 Overland Avenue, Dept. S-78, Los Angeles 34

## OUT OF PAWN!

## Genuine DIAMONDS

**Direct to You**—Save up to 50% and more on fine quality, Genuine Diamonds, reset in beautiful modern mountings, styled for Ladies and Men—Sold with an Iron-Clad Money-Back Guarantee. Over 100,000 satisfied customers. Order now from this ad. Write us for FREE ILLUSTRATED CATALOG of other Unredeemed Diamond Pledges from \$5.00 to \$5000. Send today. Reference: Any Bank or any Mercantile Agency.

1/5 CARAT  
\$125 Value

**\$49**  
Tax incl.

1/2 CARAT  
\$200 Value

**\$95**  
Tax incl.

## BERMAN'S COLLATERAL LOAN BANK

Dept. PS-9, 636-38 W. Balto. St.

Baltimore 1, Md.

## REFRIGERATION

**AIR CONDITIONING**—Trained men paid well to service, install, maintain, repair, rebuild household and commercial refrigerators. Opportunity for full time, spare time earnings. Train at home or in our big shops. Approved for Veterans. (Non-Veterans inquire about our Low Payment Plan and Pay After Graduation Plan.) Send for FREE BOOKLET and FULL information. No obligation.

COMMERCIAL TRADES INSTITUTE, Dept. JI-7  
1400 W. Greenleaf Chicago 26, Illinois

## EYE-GLASSES by MAIL NEW

Send No Money!

16-Day Trial Offer  
NEWEST STYLES



LOW  
PRICES

FREE Scientific Sight Test Chart and Catalog. Write today.  
U.S. EYE-GLASSES CO. 1557 MILWAUKEE AVENUE  
Dept. 7-42, CHICAGO, ILL.

## Sharpen Lawnmowers MAKE \$5.00 PER HOUR

You need no experience to operate the Ideal Lawn-mower Sharpener. It is simple to adjust, simple to operate. Sharpens blades easily, speedily, accurately. Ideal sturdy, strong construction is the result of 45 years of engineering design. WRITE TODAY FOR FREE BOOK.



## The FATE-ROOT-HEATH CO.

DEPT. D-4, PLYMOUTH, OHIO



## BARGAIN 3X ARMY TELESCOPE

Original Cost \$150.00—Our Price **\$7.50 ALL COATED LENSES—BRAND NEW**

• Excellent for viewing objects, landscapes, seashores, etc. The high resolving power of the six coated lenses, five of them achromats will bring out great details. For the experimenter it can be dismantled and used for hundreds of projects. Length 22½ inches, 36° Field. Postpaid \$7.50. AN IDEAL GIFT.

500,000 Lenses and Prisms

A. JAEGER, 123D-26 ROCKAWAY BLVD., SO. OZONE PARK 20, N. Y.

SEND 3c STAMP FOR "BARGAIN" LIST



# DRAFTING

**Plan for a TOP PAY JOB**  
**PRACTICAL, MODERN HOME TRAINING PLAN**  
**Drafting Outfit Included**  
**Send for FREE Lesson**

Here is a modern, practical way to learn Drafting right in your own home. You are furnished all the instruments and supplies you need to actually do the assignments, and the entire Drafting outfit is included at no extra cost. Visual aid instruction helps you learn quickly, easily—you receive projector and slides. Draftsman has a Key Job in industry—many executives advanced to present top positions with aid of a knowledge of Drafting. Find out about this up-to-date C.T.I. training program in Drafting. Write today for FREE lesson and full information. No obligation.

**COMMERCIAL TRADES INSTITUTE, Dept. J1-7**  
**1400 W. Greenleaf, Chicago 26, Ill.**

**C.T.I., A Nationally Known School**



## BE AN ARTIST

Send for interesting picture book  
**"BUILDING A FUTURE"**

Explains the unique position of the professional artist in American life. Gives examples of huge professional income. Tells definitely how YOU can acquire PROFESSIONAL skill—AND PROFESSIONAL INCOME—within one year—in spare time at home. No obligation. Book is free. Write name, address and age on penny postcard and mail TODAY to:

**GRANT SCHOOL OF ART**  
**Dept. 208-B, 53 W. Jackson Blvd., Chicago 4, Ill.**



## LEARN MOVIE PROJECTION THEATRE MANAGEMENT

The Motion Picture Theatre Business offers big opportunities for trained men. Get into a fascinating field with a promising future. Train at home in spare time. Free Catalog. Established 20 years.

**THEATRE INSTITUTE, 385 Washington St., Elmira, New York**

**V-8  
 DUALS  
 & SINGLES**



DEALERS WANTED

## MUFFLERS STEELS and ALUMINUMS with a motorboat tone

SINGLES, Chev., V-8, Plymouth, Steels \$5.50, Aluminum \$7.00. Chry., Olds., Buicks, etc., Steels \$7.50, Aluminum \$9.00. V-8 and MERCURY DUALS, Steel \$17.50, Aluminum \$21.00. Split Manifold Sets, Steels \$35.00, Aluminum \$45.00. Aluminum are guaranteed for life of your car.

**SANDEE MUFFLER CO.**

BOX 296 LA TIJ., LOS ANGELES 43, CALIF.  
 2624 W. SLAUSON AVE., LOS ANGELES, CALIF.

## 35mm FILM for LEICA, KODAK, ARGUS

and other similar cameras

**ANSCO**

**KODAK**

**DUPONT**

**ONLY \$1.40 per 100 ft. ROLL**

Each roll of film contains 18 strips of 36 exp.—properly notched.

Supplied on Reels in Metal Cans

All Film Guaranteed—Immediate Delivery

Send \$1.40 for each 100 ft. roll and we will ship your film immediately. We pay postage.

New Plastic Cartridges, 10c ea.

Eight-Sixteen Films, Inc., 630 Ninth Ave., Dept. PS-6, N.Y. 19, N.Y.

# Learn

# DIESEL

**AUTOMOTIVE AND ALLIED MECHANICS**  
**at Home in Spare Time**



**GOOD PAY AND INTERESTING JOB OPPORTUNITIES IN THE DIESEL INDUSTRY!**

These two  
**FREE BOOKS**  
 will tell you how

Diesel engines are used in locomotives, tractors, farm machinery, stationary and portable power plants, oil pipeline pumping stations, Diesel trucks and buses, power shovels, excavating machinery and many other applications. Trained Diesel and automotive mechanics are in steady and growing demand to install, maintain and repair Diesel, semi-Diesel, and gasoline engines in these and other fields.

You can qualify with National Schools' approved Master Shop Method of Home Training! Or you can operate your own service shop or commercial garage! Send the coupon today for a Free Sample Lesson and big illustrated book "Your Future in Diesel."

Home Training Developed in National's Great Shops and Laboratories. With Shop Method Home Training you learn not only basic Diesel engine principles, construction and repair, but the more specialized fields of Diesel fuel injection, automotive carburetion, ignition and motor tune-up. Your instruction material is interesting, well illustrated, easy to understand . . . and complete!

Home Study and  
 Resident Training Offered  
**NATIONAL SCHOOLS**

Est. 1905

Los Angeles 37, California

APPROVED FOR  
 VETERANS

Check Coupon Below

## MAIL OPPORTUNITY COUPON FOR QUICK ACTION

**NATIONAL SCHOOLS, Dept. PSD-7**

**4000 South Figueroa Street**

**Los Angeles 37, California**

(Mail in envelope or  
 paste on penny postcard)

Mail me FREE the book, YOUR FUTURE IN DIESEL, together with the Sample Lesson. I understand I may keep and use the information with no obligation.

Name.....Age.....

Address.....

City.....Zone...State.....

☐ Check here if Veteran of World War II



# ELECTRICIANS

## Get this Great Book FREE

Book of 150  
Shop Prints,  
Wiring  
Diagrams,  
Full Size  
8 1/2 x 11"



For Merely Examining  
Coyne's NEW Pay Raising

## 8 Volume Set APPLIED ELECTRICITY

Here's a brand new set of electrical books to give you the "know how" on all branches of electricity from appliance repairing to D.C. and A.C. equipment, electrical refrigeration, Industrial Electronics, etc. 3,400 subjects, 11,500 facts, latest methods explained in easy to follow instructions. To prove how valuable and Practical this set can be to you, I'll give you a FREE copy of my book "150 Shop Prints and How to Read Them" just for looking over this set. Written by the Coyne Staff and backed by 47 years' experience, this set has helped many ambitious electrical workers to bigger pay and added opportunity.

**OFFER LIMITED • ACT NOW!** If you act promptly, I'll send you the 8 volume set Applied Practical Electricity for 7 days FREE examination... together with the 150 Shop Print Book. Look the set over 7 days. If you like it send either \$22.75 cash or \$3.00 after 7 days and \$3.00 per month until \$24 is paid. If you don't want the set, return it and YOU OWE NOTHING. In either event you keep the 150 Shop Print Book absolutely FREE.

Coupon below is just a request to see the books free and to get my gift book for doing it. ACT—Send coupon Today!

Technical Book Div. COYNE ELECTRICAL SCHOOL  
500 S. Paulina St., Dept. B8-R8, Chicago 12, Ill.

**FREE BOOK**  
Coupon



SEND NO MONEY

B.W. Cooke, Director, COYNE ELECTRICAL & RADIO SCHOOL  
500 S. Paulina St., Dept. B8-R8, Chicago 12, Ill.

O. K. send me, postpaid, Coyne's new 8 volume, "Applied Practical Electricity" for 7 days FREE TRIAL per your offer. Also send, absolutely FREE, the book of 150 Shop Prints as a gift.

Name.....Age.....

Address.....

Town.....Zone.....State.....

## PORTABLE BENCH GRINDER \$18<sup>95</sup> less motor and stones

Suitable for hobby shops and excellent for industrial work requiring heavy buffer or grinder. Rugged 100% steel construction. Life time sealed ball bearings. Adjustable tool rest easily fixed for face or side of stones. Convenient toggle switch. 13" between wheels allows wider range of work 6" x 1" x 1/2" stones—can be used until only 2" left. Can be permanently mounted or will rest firm without bolting.

Costs only \$18.95, without motor or stones. 1/2 H.P. GE motor, 60 cycle, \$21.50. Bench grinder stones to fit, \$2.50 ea. Send check or money order. Shipped F.O.B. Pasadena, Calif. ORDER DIRECT. Today. Write for Free Bulletin No. 21-A MODERN MANUFACTURING CO., 160 N. Fair Oaks, Pasadena 1, Calif.



## The HAMSTER MANUAL



By Albert F. Marsh

## READ THE HAMSTER MANUAL

The most complete guide book on the successful breeding and raising of Syrian Golden Hamsters. Tells all about this new, fast growing, profitable and interesting hobby industry. Reveals all the secrets of the largest breeder of these delightfully profitable pets and laboratory animals. 34 Chapters

chuck-full of information gleaned from actual experience as a breeder. Twenty Pages of illustrations. A few subjects are: history, housing, three methods of breeding, easy to get feeds, sexing, fertility vitamins, handling, educational, scientific projects, crating, profits and selling, where to buy and how to sell hamsters. Sent postpaid for \$1.00.

Albert F. Marsh, 1524 Basil St., Mobile, Alabama

# LEARN EXPORT



Buy and sell world-wide without capital. Travel abroad if desired. Export men and women in demand. Your own business — profits unlimited. Salaried jobs — up to more than \$10,000 a year. Practical, low cost WORLD TRADE COURSE teaches you quickly at home in spare time. No previous special experience or schooling needed. World Trade Certificate awarded. Write today for FREE DETAILS. No obligation. Please state age. Air-mail reaches us overnight. THE MELLINGER CO., Exporters-Importers, 1422-A1 Westwood, Los Angeles 24, Calif.

Plastic Coasters  
and Tiles

## EMBED REAL FLOWERS in NEW Magic PLASTIC



Make fine gifts, novelties, things to sell. Embed real flowers, butterflies, medals, photos. Make book-ends, jewelry, figurines, and hundreds of other useful and decorative objects that are distinctive and different. Castolite is crystal clear, may be dyed for brilliant color effects. Can be sawed, carved, turned, drilled. Pours cold, sets at low temperature. No training, no tools required. Order big 20-PROJECT CASTOLITE KIT today.

Contains everything to get started at once. Pay postman \$3.50 plus postage, C.O.D. fee.

SEND NO MONEY

THE CASTOLITE COMPANY Dept. H-4 Box 391, Woodstock, Ill.

Get Ready for Big Opportunities!

Engineer Dobe

## TOOLS AND EQUIPMENT SENT WHEN YOU START

Get a better job with more pay and pleasant working conditions. Get into Drafting—where all products start. I will train you at home—give you experience—on the same kind of jobs you will do with the best paying firms. I furnish instruments and all equipment when you start. Write today for vital facts and FREE book. Give age.

ENGINEER DOBE • Div. 2B, Libertyville, Ill.

I Will Train You at Home Until You Get a

## GOOD PAY JOB in DRAFTING

## Earn Extra Cash! BE AN ARTIST!



Get in on the amazing profits in this uncrowded field! 20 beautiful art lessons—over 125 drawings—glamorous figures, portraits, cartoons, etc., with clear instructions on how to draw. In a handsome, colorful 12" x 14" Hollywood portfolio. POSTPAID \$3<sup>95</sup> SPECIAL FREE GIFT WITH ORDER!

MONEY BACK GUARANTEE

MOVIELAND ARTISTS  
P. O. Box 7741, Los Angeles 15, Calif.

# FIREWORKS

## CHINESE FIRE CRACKERS

1 Bundle or 1280—1 1/2" Crackers..... \$4.50  
1 Bundle or 1600—1 1/2" Crackers..... 5.35

## BALLOONS—LATEX RUBBER

No. K 10, per gross..... \$1.50  
No. K 20, per gross..... 3.00

Write Dept. R for Wholesale Quotations.  
Send Remittance with Order.

UNITED FIREWORKS MFG. CO., INC.  
Dayton 7, Ohio



## LEARN TO EARN!

• SKILLED MEN NEEDED NOW!



Resident or  
Home Study

- MECHANICAL DRAFTING
- TOOL AND DIE MAKING
- TOOL DESIGN AND ENGINEERING
- MACHINIST TRADE
- PRODUCT DESIGN AND ILLUSTRATION

APPROVED FOR CIVILIANS  
AND VETERANS . . . .

for BIG PAY  
JOBS in the  
METAL TRADES

Train Now!

IN  
Nationally known,  
fully approved  
school and  
endorsed by  
industry . . . .  
Est. 1928

Free Employment  
-Service . . .

Write for Catalog  
A 1c Postcard will do.

ALLIED SCHOOL OF MECHANICAL TRADES

1338-1340-1342 So. Michigan Ave.

447 Allied Bldg.

CHICAGO 5, ILL.

## NEW SELF-DRIVE B-M POWER MOWER!

For Modern Lawn Care

End grass-cutting drudgery with  
B-M's newest model self-drive,  
three-wheel, rotary blade mower.  
Equipped with 1 1/2-2 h.p. Clin-  
ton Engine. Smooth, positive  
clutch. Handlebar controls.  
Light. Sturdy. Puncture-  
proof rubber tires. Shipped  
completely assembled.  
Other models available,  
including build-it-your-  
self kit of parts. Prompt  
shipment.  
Order direct  
if not sup-  
plied by  
dealer.  
Dealer  
inquiries  
invited.

LOW  
PRICED  
•  
FULLY  
GUARAN-  
TEED  
•

Write  
For FREE  
Literature

B-M MOWER CO., Box 66-S, Blue Mound, Kansas

## COMBAT JUDO

Fiercest fighting technique known. Learn  
trick knock-outs, police tactics, and the art  
of Defense and Attack. Expert instructions  
in THREE volumes with 200 photographs  
and illustrations. Complete. . . only \$2.25

VARIETY HOUSE

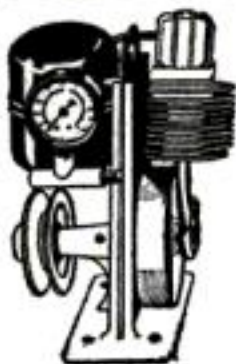
Box 46-AC Wall St. Sta., New York 5, N. Y.

## ARMY SURPLUS A-C PLANTS

Nation's greatest bargains in sur-  
plus 110-volt, 60-cycle, 2500-watt  
power plants, Briggs Engine drive.  
Ideal for farmers, ranchers, con-  
tractors for full time or emergency  
power. (Cost Govt. \$535.) Low as  
\$174.50. Fully reconditioned plants \$229.80 prepaid. 2500-  
watt practically new A-C generators \$129.80 prepaid. Brand  
new famous Salsbury gas engines 6 1/2 H.P. \$82.90 (cost  
\$162.50.) Free plan to make units full automatic starting.  
Free Catalog.

LECO ENGINEERING CO. Box 908-PS7, Lincoln, Nebr.

Say You Saw  
It In Popular Science



## COMPRESSED AIR INSTANTLY, Anywhere!!

Portable Air Compressor and storage tank. Ruggedly built  
of best materials using lifetime lubricated ball-bearing on  
connecting rod and oil impregnated main bearing on shaft.  
Unusual design forever eliminates valve trouble, the most  
common fault in air compressors. PATENTED unique air in-  
take system increases efficiency tremendously over other  
compressors so that air output is much greater than that  
from larger compressors powered by heavier motors. Will  
deliver approximately 3500 cu. inches of air per minute at  
maintained pressure of 30 lbs., or will inflate a 90 lb. truck  
tire in less than one minute. Comes complete with 100 lb.

gauge, although finger-tip adjustment allows setting of out-  
put pressure at any value, which will automatically be main-  
tained. Works from any 1/4 H.P. motor. Useful for spraying  
paints or lacquers, disinfectants, insecticides, annealing or  
brazing with natural gas, inflating tires, etc. Price \$14.50  
postage prepaid anywhere in the U. S. Efficient, completely  
adjustable syphon type spray gun complete with 12 ft. of  
100 lb. tested hose available for only \$7.75 with pint con-  
tainer, also prepaid. 25% required on all C.O.D. orders.  
Send for free catalogs of radio parts and surplus items.

BUFFALO RADIO SUPPLY; 219-221 GENESEE ST., DEPT. S-4, BUFFALO, N. Y.

Carries  
the Same  
90 DAY  
GUARANTEE  
As a New  
Motor Assy.

Our Finest Precision REBUILT

## MOTOR BLOCK ASSEMBLIES

Sold Outright or Exchange

Rebuilt by skilled mechanics. As-  
sembly has Reborn Block with  
New Pistons, Pins, Rings, Re-  
ground Crankshaft, and all New  
Bearings. Guaranteed 90 Days.  
Allowance on Old Motor  
We ship at outright price. Send  
your motor prepaid, must be suit-  
able for rebuilding. Send in no-  
tarized bill of sale showing title  
number if any. We refund differ-  
ence when we receive your motor.

\$5.00  
Crating  
Charge

BUICK Outrt. Exch.  
34-47 8 cyl. \$199.00 \$160.00

CHEVROLET Outrt. Exch.  
29-47 6 cyl. 117.50 87.50

CHRYSLER Outrt. Exch.  
34-47 6 cyl. 162.50 130.00  
35-47 8 cyl. 199.00 160.00

DE SOTO Outrt. Exch.  
34-47 6 cyl. 162.50 130.00

DODGE-3 1/4" bore  
33-47 6 cyl. 144.00 109.00  
3 3/8" bore Outrt. Exch.  
34-47 6 cyl. 162.50 130.00

FORD Outrt. Exch.  
28-31 4 cyl. 119.00 87.00

FORD Outrt. Exch.  
32-34 V8. \$139.00 \$99.00  
35-47 V8. 149.00 99.00

HUD.-TERRA Outrt. Exch.  
35-47 6 cyl. 175.00 135.00

MERCURY Outrt. Exch.  
39-47 V8. 149.00 99.00

OLDSMOBILE Outrt. Exch.  
37-47 6 cyl. 175.00 135.00  
35-47 8 cyl. 199.00 160.00

PLYMOUTH Outrt. Exch.  
33-47 6 cyl. 139.00 109.00

PONTIAC Outrt. Exch.  
37-47 6 cyl. 175.00 135.00  
35-47 8 cyl. 199.00 160.00

STUDEBAKER Outrt. Exch.  
35-47 6 cyl. 175.00 135.00  
35-47 8 cyl. 199.00 160.00

We Can Supply REBUILT ENGINES, TRANSMISSIONS, REAR ENDS  
etc., for Cars and Trucks, Also JEEP ENGINES. Write for Prices!



## 60 HP. JEEP Engines

Reconditioned, Tested and  
Guaranteed in perfect running  
order and ready to run. Every  
part is checked to be perfect  
and carries a 90 Day Guar-  
antee same as a new engine.

COMPLETE with . . . Genera-  
tor, Starter, Distributor, Coll.  
Fan and Fan Belt, Water Pump.  
Fuel Pump, Intake and Ex-  
haust Manifolds, Carburetor,  
Oil Filter, Spark Plugs, Fly-  
wheel, Clutch and Pressure  
Plate, and Wiring.

Outright, \$198.50  
SG58R-003, Each

## 65 KW. 225 Volt D.C. DIESEL ELECTRIC GENERATING UNIT

RECONDITIONED

Equipped with 6 cyl. DRXB  
Hercules DIESEL engine,  
4 3/4" bore, 5 1/4" stroke, 120  
H.P. at 2000 R.P.M. Com-  
plete with injector, pump,  
nozzles and electrical equip-  
ment. Generator attached to  
engine. Complete as shown.

RADIATOR  
for above  
Unit. . . . \$69.50

SG60R-103 \$1095.00  
Each

SEND 25% CASH WITH ORDER, BALANCE C.O.D.

J.C. WHITNEY & Co.  
1919 Archer Ave. Chicago 16, Ill.



# Learn A Trade NOW! PRACTICAL SHOP TRAINING!

In Our Chicago Shops  
**TRADES THAT PAY**

**LEARN BY DOING**

- Auto Mechanics    ■ Machinist
- Diesel Engines    ■ Welding, Gas & Arc
- Refrigeration    ■ Piano Tuning

Above approved for G.I.'s & Civilians

■ Body & Fender Repair

ESTABLISHED 1902  
VISITORS WELCOME

—CALL IN PERSON OR MAIL THIS AD TO—  
**GREER SHOP TRAINING**

(Dept. PS-378) 460 South State St., Chicago 5, Ill.

Please send without obligation free information regarding trade checked above. (Specify whether you are a Veteran ☐ or Civilian ☐)

Name.....Age.....

Address.....

City.....State.....



## FIX SEWING MACHINES

BIG MONEY. Spare or full time. Open your own neighborhood shop. Thousands need repairs. Send for complete Service Manual—only \$1.98 postpaid. Money back guarantee.  
SEWING MACHINE SERVICE CO.    Hamilton 26-CC, Ohio

## LEARN ACCOUNTING SALESMANSHIP SECRETARIAL WORK

### Assure Your Future Now!

Hill's, one of America's outstanding Business Schools, offers you the opportunity to enter one of the three fields acknowledged to hold substantial earnings and a secure future. Our FREE book, "Through Hill's to Success," tells how and where the best positions are found and how you can qualify for them by study at home or in our resident school. We have thousands of successful graduates and maintain nationwide employment service.



**USE THIS HANDY COUPON**

**HILL'S EXTENSION SCHOOL, Dept. PS-7  
AND BUSINESS UNIVERSITY.**

619 W. Main St., Oklahoma City 2, Okla.

Please send me your Free book, "Through Hill's to Success."

NAME.....

ADDRESS.....

CITY.....STATE.....

☐ Check here if eligible under G.I. Bill.

## PRINT YOUR OWN POST CARDS

COMPLETE  
OUTFIT  
only  
**\$7.50**



Amazing results in sales, inquiries and contacts... saves time and money... very easy to use GEM STENCIL DUPLICATOR is ideal for Advertising, Announcements, Notices, Labels, Forms, Price Lists—hundreds of uses for every type of business and organization. Comes complete with all supplies, instructions and 60-page Book of Ideas.

**FREE TRIAL OFFER:** Try it before you buy it! Write and a GEM OUTFIT will be sent you postpaid. After 10 days, send only \$7.50 or return the GEM, no questions asked. The GEM must sell itself; you be the judge.

**BOND EQUIPMENT CO. • Dept. 151  
513 Olive St. • St. Louis 1, Mo.**

SEND NO MONEY • FREE TRIAL OFFER

## AUTO BODY & FENDER REBUILDING

Tired of Working for the Other Fellow?

### Be Your Own Boss

A Big Field for Your Future

Body & Fender Rebuilding is one of the best paid branches of the automobile industry. Go into business for yourself or prepare for good job opportunities. Train at home or in our big shops. Approved for Veterans.

(Non-Veterans inquire about our Low Payment Plan and Pay After Graduation Plan.) Send for FREE Booklet and full information. No obligation.

**COMMERCIAL TRADES INSTITUTE, Dept. FI-7  
1400 W. Greenleaf Avenue, Chicago 26, Ill.**

## U. S. ARMY P.X. SPECIAL PIPES

ALL NAME BRANDS

Sold in better stores everywhere \$5 to \$10. Genuine imported briars for a good dry smoke. All individually boxed with cloth bag. Complete assortment of sizes and styles. Just \$1.95 ea. 3 for \$5. State bowl style, second and third choice. Send check with order.

STYLE KING  
WEBER  
MASTERCRAFT  
JOHN SURREY  
STARCRAFT  
DANCO

**M & L SURPLUS SALES**

121 No. Glendale Ave.,  
Glendale, Calif.

## NEW! MINIATURE DUST MASK



Wear when sanding, grinding, paint spraying, sweeping, dusting, furnace cleaning, etc. Handy as a pair of glasses. Just keep mouth closed and breathe through nose is all you do to operate. Protects against dusts, lint, coal, cement, grain dust, HAY FEVER POLLEN. Has 9 sq. in. filter.

JERRY BRYANT, Dept. PS, 919 N. Michigan Ave., Chicago 11, Ill.



Take a Deep Breath... and Your Tie Mysteriously Rises!  
Lift Up a Drink... and Your Tie Comes Up Too...  
WITH THE NEW FAMOUS

## FLIP-UP TIE!



Loads of laughs—just waiting for your order! It's the famous FLIP-UP TIE—funniest thing in town. You can make your tie pop up instantly, lie flat in a second—you control the speed. Startle your gang into howls of laughter next time they get together—get the FLIP-UP—it's the life of the party!

COMPLETE \$1.98  
Satisfaction Guaranteed  
Special Price to Dealers

SEND NO MONEY—Rush your order today, remit with your order and we pay postage or order C.O.D. plus postage.

**BERNARD FINE CO., Inc.**

Dept. PST-2, 501 Sixth Avenue, New York 11, N. Y.



# Ball-Bearing SPEED WHEELS



Juvenile wheels, solid tire—No Bearings

7" wheels.....60c  
6" wheels.....50c  
4" wheels.....30c

Semi-pneumatic tired wheels

12 x 1.75".....\$3.25  
10 x 1.75".....\$2.75  
10 x 1.25".....\$2.00  
8 x 2".....\$2.00

Industrial wheels for heavy loads

Semi-Pneumatic  
400 x 8, 2 ply tire and tube \$12.50  
10 x 2.75" Hollow Core.....\$6.75  
10 x 2.75" Single Tube.....\$7.25  
12 x 3.00 wheel bolted hub \$9.75  
8 x 2.50".....\$4.90  
6 x 2" spot welded.....\$2.80  
6 x 2" lug base @.....\$3.30

Dealers and  
Manufacturers  
Inquiries invited

Free blueprints with all wheel orders.  
Send check with order. Shipments f.o.b. Akron.

**JIM BROWN TOY COMPANY**

1093 Home Ave.

Akron 10, Ohio

# BAR BELLS



Buy Direct From Factory

Save 20% to 30%

Write for Free Booklet  
and Price List

**\$8<sup>95</sup>  
up**

**INDEPENDENT IRON WORKS**

2416 EAST 23RD STREET, DEPT. C  
LOS ANGELES, CALIFORNIA

# "WONTWIST" ANIMAL TETHER

**\$250**

Check or  
Money Order

with 12 ft. chain add \$1.50

Placed below surface of ground, ball re-  
volves in every direction; For Dogs, Goats,  
Calves, Cows, Sheep.



**THE HAYDEN COMPANY**

Bryn Mawr

Dept. PS,

Pa.

# TRI-STATE COLLEGE

B.S. Degree in 27 months in Engineering (7 branches), Bus.  
Admin., Acctg. and Sec. Science. Graduates successful. 65th  
year. Enter Sept., Jan., March, June. Write for catalog. 578  
College Ave., Angola, Ind.

**EARN  
MONEY  
IN ANY  
CROWD**

## MIND READING

Tell unspoken questions.  
Call names of strangers.

Tell anyone where and when they were born, their  
address, telephone number, and dozens of other  
things. Complete instructions in professional mind  
reading course. Only \$1. complete. Order now!  
**STANDARD PUBLISHING CO.** Dept. MR-4120  
930 F Street, N.W., Washington 4, D. C.

## MULTIPLY MENTALLY ANY NUM- BER BY ANY OTHER NUMBER.

without paper, pencil or machine. Written  
by a C.P.A. Send only 50c for **MENTAL  
MULTIPLICATION**.

Chas. Lipkin, Dept. PS, 249 W. 34th St., N. Y. 1

# Become a Doctor of PSYCHOLOGY

Win the degree of Ps.D. Teach the secret of contentment, happiness.  
Solve mental worries. Experience the revelation of truth. Chartered  
college. Individual help. Write for **FREE** book. **COLLEGE OF  
UNIVERSAL TRUTH**, 5153-A North Clark St., Chicago.

Write for  
**FREE**  
Illustrated  
Brochure

## PHOTO NEGATIVE RETOUCHING

Five week home study course in Photo Negative  
Retouching, including all equipment and **\$21.50**  
instructions.....

**Marshall Photographers, Inc., School Division**  
Dept. PS-7, 162 N. State St., Chicago 1, Ill.



A GENUINE

## Hookah-Turkish Water Pipe

which gives The Coolest—Cleanest—Sweetest Smoke.  
The automatic filtering of the smoke thru water removes  
tars and bitter taste ensuring the sweetest coolest smoke  
you ever enjoyed. This beautiful pipe stands 1 foot high. Has  
large size genuine briar bowl with four foot flexible smoking  
tube. No pipe collection complete without one. Makes unique  
gift. **DON'T WAIT!** Get one while supply lasts. **ONLY \$2.95.**  
Add 20c for postage & handling. Send Money Order or check to—

**ACME SALES SERVICE**

Box 41 Ridgewood Sta.

Brooklyn 27, N. Y.

# New Easy Way TO MAKE BIG MONEY!

AT  
HOME

FULL  
OR SPARE  
TIME

## Permanently METALLIZED BABY SHOES

## Costs You Only 5¢-You Get \$6.00

Now is the time to cash in on this big-paying, easy-to-operate  
year 'round business, and you need no experience! With actual  
illustrations and step by step instructions, YOU can start earn-  
ing money in only one week—up to \$1000 per month full time, or  
\$50 to \$75 per week spare time... at  
\$5.00 per hour. Working only a few  
hours you can make more money than  
most people make working an entire  
week.

### LARGEST NUMBER OF SUCCESSFUL BUSINESSMEN

Our course has the largest  
number of successful busi-  
nessmen in this field to-  
day! They are all men and  
women who acted and are  
making money. This course  
is guaranteed—your money  
will be fully refunded if  
you are not more than  
satisfied. There is nothing  
to lose, so act at once.

- Money Back Guarantee
- Most Successful Name  
in Metallizing
- Big Income
- Huge Demand
- Sales Plans
- Future Security
- Your Own Boss

### IMMEDIATE RESULTS

This tested and proven method shows  
you complete details, so that you may  
start at once, metallizing Baby Shoes,  
with real GOLD, SILVER or BRONZE.  
They will last forever, retaining every  
priceless detail of the natural shoes,  
something for which there are 5 million  
new customers waiting to buy every  
year.

### BEGIN AT HOME

Don't pass up this real oppor-  
tunity to start your own business  
on a shoestring right at home.  
**ACT NOW!** We will send you  
all the details absolutely  
free.



## FREE!

Two actual metallized Baby Shoes  
guaranteed to be the most at-  
tractive on the market—or a  
pair of your own Baby  
Shoes metallized if  
you prefer.

Name\_\_\_\_\_

Address\_\_\_\_\_

City\_\_\_\_\_

State\_\_\_\_\_

**SEND NO MONEY**  
USE  
THIS  
COUPON

**KIKTAVI**  
Company Dept. S-1

2111 W. Manchester  
Los Angeles 44, California

Rush me **FREE** full particulars at once.



## STOP WATCH



Genuine Elgin 15 Jewel movement. Ideal for split second timing. Full sweep split second hand graduated in 1/10th seconds. Stem wind, start, stop and reset. Used but guaranteed perfect. A splendid value.

Shp. wgt. 1 lb. No. 200—Each..... **\$9.95**

## MESS KITS

Regulation two-piece Army Mess Kits with folding handle. Used, but perfect. Weight 2 lbs. No. A116—Each..... **69c**

## CANTEENS

Reg. U. S. issue canteens. Plastic screw top chained to body. Slightly used but perfect. Wgt. 1 lb. 117—Metal 118—Plastic—Each..... **69c**

## CANTEEN CUPS

All metal. Folding handle. Wgt. 1 lb. No. A120—Each..... **25c**

## CANTEEN COVERS

Heavy canvas. Button fastener. New No. 530—Each..... **69c** Used No. 119—Each..... **35c**

## WIRE CUTTER

Heavy duty type with compound leverage. Cuts up to 1/4 inch wire. Extended upper jaw acts as feeder to cutting edges. Insulated handles. Ideal for farm fence work and shop use. Shp. wgt. 2 lbs. Stock No. 392—Each..... **\$1.95**

**Heavy Duty Rubber Gloves**  
BRAND NEW



Extra heavy—extra long. Brand new, high quality gum rubber for softness and ease in use. Designed for heavy duty industrial service—protection in handling chemicals, acids, etc. A real bargain at this low price. Stock No. 295—**79c** Per Pair, Only.....

## AVIATOR'S OXYGEN OUTFITS

Bail out type. Consists of all metal tank, release valve, gauge and breather hose, all enclosed in khaki colored cloth bag. These tanks are loaded with oxygen at 1800 pressure. Ideal for use as reserve oxygen supply for all types of emergency use. Shipping weight 4 pounds. All brand new. Stock No. 391—Each... **\$4.95**

## OXYGEN TANK

Loaded with aviator's breathing type oxygen at 1800 pounds pressure. Tank measures 13 1/2 x 5 1/2 inches with rounded ends. Tank is of solid metal fitted with brass release valve at top. Brand new! Loaded—ready for all types of emergency use. Shp. wgt. 13 pounds. Ship exp. only! Stock No. 390—Each, only..... **\$3.50**



## TYPE D2

A high pressure shatterproof tank of 500 cubic inch capacity—for 50 pound pressure or 6.9 cubic feet. All metal—measures 6 1/2 x 2 1/2 inches. Threaded plug end vents. Shp. wgt. 6 lbs. No. 386—Each... **\$2.45**

## TYPE F1

A high pressure shatterproof tank of 1000 cubic inch capacity—for 50 pound pressure or 13.8 cubic feet. All metal—measures 9 1/2 x 1 1/2 inches. Threaded plug end vents. Shp. wgt. 11 1/2 lbs. No. 389—Each... **\$3.75**

# WAR SURPLUS AND HUNDREDS OF OTHER BARGAINS

## POPULAR RECORD ASSORTMENT



No. A300—25 Records. All Dance. Wgt. 14 lbs..... **\$4.88**

No. A301—25 Records. Hillbilly, Race and Blues. Wgt. 14 lbs. Set... **\$4.88**

No. 302—25 Records. All Hillbilly numbers. Wgt. 14 lbs. Set... **\$4.88**

Fifty records of modern dance, race, blues and hillbilly selections. No two alike. Famous name bands and artists included. Used in juke boxes, but guar. perfect. Shipped exp. collect only—no exchanges or refunds. Wgt. 28 lbs. No. A303—50 records..... **\$9.64**

## FLEX. NECK FLASH LIGHT

Ideal trouble shooter's flashlight. Flexible neck lets you direct light around corners and inaccessible spots. Brand new! Plastic case with BX type neck. Uses 2 standard flashlight batteries. (Less batteries) Shp. wgt. 2 lbs.



No. 205 Each

Has spare bulb in handle. **\$1.39**

## WATERPROOFING COMPOUND

Govt. surplus! A liquid formula for waterproofing tents, tarpaulins, canvas clothing, etc. Equally efficient on old or new materials. Gallon covers 100 to 120 square feet. Stays flexible. Will not peel or chip. Shp. wgt. 10 lbs. Stock No. 423. Per Gallon..... **\$1.49**



ARMY AIR CORPS TYPE

## SUN GLASSES

Ideal for driving, sun glare, sports and work. 24 carat gold plate frames with Pyralin sweat bar—adjustable nose bands. Large aviation type lenses. Case included. Shp. wgt. 1 lb. No. 238—Per Pair..... **\$2.95**

## 7 LB. EXPERIMENTER PARTS ASSORT. KIT



A "gold mine" for the radio serviceman. Hundreds of valuable radio parts, new radar and electronic parts and subassemblies, coils, resistors, trimming condensers—worth many times this low price. A130R—7 lbs.... **\$1.79**

## PUP TENTS



Regulation Army Pup Tents of durable, brown canvas. Used, but in good condition. Fine for campers, outdoorsmen, Boy Scouts, etc. Wgt. 8 lbs. A100—Tent only.... **\$3.95** A110—Tent, new ..... **\$7.95** A101—Ropes, wooden poles and stakes for above. Per set..... **\$1.00**

## VEEDER ROOT COUNTING MACHINE



Five wheel type—counts to 99,999 and repeat. Nickel finish case. Has 1 1/2 inch round shank. Use it for any counting job. Brand new. Shp. wgt. 1 lb. No. 241. **98c** Each.....

## ARMY TENTS



16x16 Ft. A value you can't beat. Big 16x16 ft. pyramid tent with 4 foot drop wall. Used but in excellent condition. Poles not included. Fine for camping out, carnivals, etc. Worth twice this money. Shp. wgt. 100 lbs. Stock No. **\$35.00** 521—Each only....

## STIRRUP PUMP

Works with any pail or bucket. Shoots a high pressure stream up to 30 feet. Use it for spraying garden and trees, for whitewashing, fire fighting, drainage, etc. Complete with 10 foot flexible hose. All brand new. Regular \$3.80 value. No. 244—**\$1.49** Each.....

## 2-Pc. Rain Suits

New 2 piece rain suits. Of durable wear resisting water and wind repellent OD fabric. Bib style pants, zipper fly. Jacket has parka attached. Guaranteed 100% weatherproof. Small, medium and large sizes. Shp. wgt. 3 lbs. No. R549 **\$4.95** Each.....



## BAYONET BLADE

Fine forged steel. Ground but not polished. May be made into throwing or hunting knife or spear. Blade 6 3/4 x 1/4 inches, 11 3/4 inches overall. Will take and hold a fine edge. Shp. wgt. 1 lb. No. 664-R—Each..... **49c**

## STRANDED AVIATION CABLE

Flexible 133 strand wire cable, 5/32 inch diam., 3300 lb. break test. Lengths up to 450 feet. Use as tow rope, guy wire, clothes line, etc. Weight per 100 feet, 4 lbs. Specify length wanted when ordering (minimum, 100 ft.). Stock No. 421. Per Foot..... **4c**

**Officers Watch Compass**  
Brand new gov't. surplus. Army-Navy model. Single jewel mounted needle. Silver colored dial. A splendid value. Shp. wgt. 1 lb. A174—Each.... **98c**

## McCLELLAN SADDLE

Brand new! Top grade cowhide. 12 inch seat. Hair girth. Has straps for blanket roll and knapsack. Gun boot and sabre loops. A real buy for any horseman. Worth much more. Shipping weight 15 lbs. Stock No. A145. Each..... **\$16.95**

## NYLON PONCHO

Fine waterproof nylon in olive drab finish. Gives real protection from storm and rain. Ideal for farmers and outdoor workers. Shipping wgt. 2 lbs. No. R160. Each only..... **\$3.95**

## AMMUNITION BOX

Used for 50mm ammunition. Heavy, all metal design with latching top and folding handle. Provides safe, fireproof storage for valuables, etc. Measures 12x8x7 1/2 inches. Used but in new condition. Shp. Wgt. 8 lbs. No. 338—Each **79c**

## RUBBER SUIT

Fits over your regular clothes and shoes. Can be cut apart for waist high waders, hip high or knee high boots, also arm length rubber gloves. Heavy gum rubber over fabric. Fine for those who work in the water, commercial fishermen, sewer diggers, etc. All brand new! Wgt. 14 lbs. No. 183 **\$4.95** —Each..... Please add 75c for postage.

## LIFE PRESERVER BELTS



Right from the invasion beaches. Consists of two air chambers. May be inflated automatically with "sparklet" cartridges or manually by attached hose. Adjustable in waist size. One air chamber guaranteed air tight—other may need a tire patch. All belts are used and slightly soiled but a bargain at this low price. No. 1261—**\$1.00** Each.....

## SPARKLET CARTRIDGES

May be used with above belts. In boxes of 10. Stock No. 254. Per Box..... **50c**

## ORDER DIRECT FROM THIS AD

Values galore! Hundreds of hard-to-find items for home, shop and outdoors. Make remittances by money-order, bank draft or personal check. Send 25% deposit on C.O.D. orders. No C.O.D.'s on orders for less than \$5.00. Include sufficient postage on parcel-post orders—any overage will be promptly refunded. All quotations F.O.B. Chicago. Used items and materials are guaranteed serviceable and as described. Your money back if not more than satisfied.

SEND 10c TO COVER POSTAGE AND MAILING ON BIG CATALOG—READY IN ABOUT 60 DAYS WRITE FOR YOUR COPY TODAY

# STARK'S

Dept. PS7  
509 S. State St.  
CHICAGO 5, ILL.



# POPULAR SCIENCE



# Classified Opportunities

*Save time - Save Money*

Classified Ads only 70c per word per insertion, payable in advance. Minimum ad 10 words. To be included in September issue, copy should be in our office by July 30th. September issue on sale September 1st.

POPULAR SCIENCE MONTHLY—351 FOURTH AVE.—NEW YORK CITY 10

## 1 AUTOMOBILES

**STUDEBAKER.** Floyd Clymer's new book (no connection with Studebaker Corporation) gives impartial, uncensored report 3000-mile economy, speed, record tests. Part by part equipment analysis. 3000 Studebaker owner opinion tabulations. 200 owner letters. Good, bad comments, no punches pulled. \$1.50 postpaid. Clymer's book on Kaiser-Frazer same prices. Clymer, Dept. B-7S, 1268 So. Alvarado, Los Angeles 6, Calif.

**MERCEDES:** Pioneer of an Industry. Profusely illustrated history. Postpaid \$2. Alec Ulmann, Riverside, Conn.

**RACING** Car Equipment for all cars. Engines, Racing Heads, Manifolds, Carburetors, Mufflers, etc. Speed instructions and literature \$1.00—refunded first order. Lee Motorcraft Co., 1412-B Great Northern Bldg., Chicago 4, Ill.

**SPEED** equipment: Edelbrock, Meyers, Offenhauser, Weiland for Ford V8 & Mercury: high compression heads \$72.00 pair. Specify compression ratio desired. Dual manifolds; new Edelbrock Super, \$44.00; Offenhauser, \$48.00; Weiland, \$44.50. Throttle kits \$5.50. Order by make and model. Chrome carburetor stacks \$2.50 pair. Chrome acorn head nuts, 20c each. Chrome acorn manifold bolts, 25c each. Racing Equipment Co., Dept. S-2, 1916 W. Valley Blvd., Alhambra, Calif.

**CLYMER'S** Indianapolis Race history book. Complete details every race held 1909 to date. 352 large pages. 1100 illustrations. Postpaid \$3.50. Deluxe Edition Fabrikoid binding, gold lettering \$5.00. 1946 and 1947 race books \$1.00 each. Complete driver history book \$1.50. Specify ones wanted. Clymer, Dept. B-7U, 1268 So. Alvarado, Los Angeles 6, Calif.

**DOUGLASS** steelpacked deeptone dual mufflers for Ford V8 & Mercury '35 through '48 \$20.00 set; singles for all popular cars \$4.95 to \$5.96. Chrome station wagon stacks \$13.00 each. Chrome tailpipe extensions 2½". Deeptone singles \$1.75, duals \$2.95. Chrome carburetor stacks \$1.25. Openings for reliable dealers. Racing Equipment Co., Dept. S-1, 1916 W. Valley Blvd., Alhambra, Calif.

**RACING** camshafts for all cars: semi. ¾, full race, and super full race. Harman & Collins or Weber for V8 Ford & Mercury \$30.00; all 6 cylinder cars \$30.00; all other 8 cylinder cars \$40.00. Winfield cams: semi. ¾ and full race for V8 Ford & Mercury \$36.00, super full race \$40.00. All prices exchange. If no exchange, price of new cam will be added. Specify make, model, type of grind desired. Racing Equipment Co., Dept. S-3, 1916 W. Valley Blvd., Alhambra, Calif.

**POWERIZED** Water Injector—Increases speed, acceleration, mileage to 30%. Easily assemble yourself for few cents! Sensational performance! Prevents wear, knock, oil pumping! Manual includes "Installation Drawings"—"Hop Up" Tips—Literature. \$1. Almquist Engineering, Milford 17, Pennsylvania.

**MODEL A** Ford instruction book. Complete details care, maintenance, 35 charts, drawings. A must for "A" owners. \$1.00 postpaid. Clymer, Dept. B-7W, 1268 So. Alvarado, Los Angeles 6, Calif.

**HOT** Rod racing book. 90 photographs, illustrations famous record holders used California Dry Lakes. Contains hotrod tips, closeup action shots, specifications, 8 beautiful drawings suitable framing. \$1.50 postpaid. Clymer, Dept. B-7V, 1268 So. Alvarado, Los Angeles 6, Calif.

**CUSTOM** Styling Manual—Easily make car look Hollywoodized, custom, ultra-beautiful by quick inexpensive methods! 100 photographs, instructions on customizing, restyling, streamlining; new and old cars. Also model, sport, conversions; accessories; mufflers; engine "soup up" specifications! Most complete book \$2. Almquist Engineering, Milford 17, Pennsylvania.

**SPEED & Mileage** manual—Obtain greater speed, mileage, racing performance from any automobile! "Original" book shows easiest soup up methods—Speed Tuning Mileage Secrets—Complete Data—Instructions on building speed equipment! Economizers! Mufflers! "Water Injectors"! Manifolds! Superchargers! "Hot Rods"! Speedsters! Fast Conversions! Engines! All about carburetion, compression, balancing, fuels! "Economy Tuning"! Latest "Hollywood Customizing" information. Photographs, catalogues, parts lists! \$1.98. Almquist Engineering, Milford 17, Pa.

**SPORT** Speed Catalogue—Latest Racing Speed equipment—Hollywood beautifying accessories—full line custom supplies—all cars! Photographs, Recommendations. Lowest Prices! 25c Refundable. Almquist Engineering, Milford 1, Pennsylvania.

**AUTOMOBILE** Racing, Sixth Edition. 100 illustrations. Working drawings with building instructions for Ford-60 midget, California roadster, Offenhauser racer. Details on racer parts. Sample entrance blank. World's record 158.5 M.P.H. rear engine four-wheel drive car. Interesting information for fans, drivers, mechanics. \$2.00 postpaid; \$2.25 C.O.D. Ray Kuns, Department 62, Cincinnati 27, Ohio.

**HOT-Rod** manual, fast Fords, photos, instructions. \$1.50 air mailed \$1.75. Racing parts list \$.25. Hollywood Hot-Rod Los Feliz, Box 9626 S. Hollywood 27, California.

**AUTOMOBILE** Racing Book. Fifth edition-revised. Tells how to build dirt tracks bodies, frames, engines. Records, superchargers, rules, formulas, plans, stock conversions, roadster racing, fast Fords. \$1.00 postpaid. \$1.15 C.O.D. Ray Kuns, Department 274, Madisonville, Cincinnati, Ohio.

**FAMOUS** Car catalog reprints. Duesenberg, Italian Maserati racing and new Sport car, Mercedes-Benz, new rear-engined Isotta-Fraschini V-8, Rolls-Royce "Silver Wraith," Miller race cars, Cord, Rayfield cyclecar, V-8 Chevrolet, Stanley Steamer, Doble Steamer. Specify catalog desired. \$1.00 each postpaid. Clymer, Dept. B-7X, 1268 So. Alvarado, Los Angeles 6, Calif.

**RACING** Car builder book. 22 drawings. Racing rules. Contains information on cams, compression, balance, midgets, big cars, roadsters. V-8 speed data. \$2.00 postpaid. Clymer, Dept. B-RB, 1268 So. Alvarado, Los Angeles 6, Calif.

**FENDER** Skirts—Factory direct—Streamlined to your fender contours—16 ga. Anodized aluminum with self latching brackets—No holes to drill. Teardrop skirts Chevrolet, Ford, Buick, Oldsmobile, 35-41. Streamlined Box Skirt Ford, 41-48. Specify year, model. Price F.O.B. \$17.95. Send check, money order. Freight collect. E. and E. Mfg. Co., 5322c Banks Street, San Diego 10, Calif.

**DUALTONE** Chrystalline packed California mufflers for all automobiles. Large chrome tailpipe extensions. Chromed carburetors, fuel pumps. Chrome mouldings. Dual manifolds. Hi-compression heads. Flywheels. Camshafts. Fender skirts. Plexiglas tops. Send 20c illustrated catalogue, deduct from first order. Dualtone Mufflers, 2636B India Street, San Diego 1, California.

**FOREIGN** Car books. British sport cars, 96 makes described, fine illustrations. Specifications \$2.00. Post-War British cars, 34 makes illustrated, specifications, \$2.00. British Motor Industry from 1896 to 1946. 176 photos, drawings. \$1.50 postpaid. Clymer, Dept. B-7Y, 1268 So. Alvarado, Los Angeles 6, Calif.

**"SPEED & Power"** handbook—Very latest methods! Construct your own superchargers, water injectors, compression heads, fuel saving devices—Easily, practically without cost. Get racing speed, acceleration, dynamic power increases from any automobile! Build stock conversions! Fast roadsters! Hotrods, Ingenious formulas! Speed secrets! Fuels, Lubricants. Get "Economy Information"—Tuning techniques! Ignition! Carburetion! Mileage tricks. Catalogues! Illustrations! Including "Restyling ideas"—Streamlining. Model revising! Customizing! Sport changes. Photographs! Parts lists! Drawings! \$1.98 complete. Newhouse Industries, 5941-A2 Hereford, Los Angeles 22.

**VAPOR-STEAMATIC**—Water Injection. Easily constructed (for less than \$1.00). Finest automatic "moist-humidity" system. Engineering triumph—gets up to 33 miles per gallon! Reduces wear, sludge. Tremendously increases horsepower. Acceleration! Eliminates ping, carbon, overheating. Smoother engine. Copyrighted, fully illustrated "Installation-Handbook," including additional "Injection-Conversions" Covering tractors, airplanes, motorcycles. \$1.00. Newhouse Industries, 5941-A1 Hereford, Los Angeles 22.

**BUILD** Automatic Clutch, midget autos, racers, scooters, tractors. 183 plans. Free handbook. Nichols Equipment Co., Dept. 912, Purvis, Miss.

**SEE** our ad under motorscooters for midget car bargains. Midget Motors Directory, Athens, Ohio.

**INTERCHANGEABLE** Parts book. New book tells every automobile part that interchanges with others. Same parts many times vary 100% in price. This book enables garages, mechanics, dealers, owners to buy under cheapest listing. Tremendous savings for users. \$15.50 postpaid. Clymer, Dept. B-1P, 1268 So. Alvarado, Los Angeles 6, Calif.

**IMAGINE**, 250 miles per gallon your car now. Literature 25c. Jet Engine Co., St. Augustine, Fla.



**BUILD** speedy Midget Track Racer from cast off parts! Plans, specifications, construction information—\$1.00. Motor Supply, Box CS-1682, Toledo, Ohio.

**INSTALL** V-8 engine in your Model A for extreme acceleration, more top speed, smoother performance. Complete details, photographs. \$1 Postpaid. A-V-8, Box L-2, Eaglerock, Los Angeles 41, Calif.

**MAKE** Your Model "A" do 100 mph. Lightning acceleration, breath-taking top speed. Complete details. Photographs. \$1 Postpaid. Four Barrel, Box L-2, Eaglerock, Los Angeles 41, Calif.

**CLYMERTONE.** Twin muffler sets, beautiful sound, complete with necessary welded pipes, E-Z installation. Ford V-8, \$20.00. Chevrolet set with split manifolds, \$37.50. Specify car model. Clymer, Dept. B-74, 1268 So. Alvarado, Los Angeles 6, Calif.

**MAKE** your Ford fast! Complete details, photographs. How to construct 120 mph Hotrod. \$1 postpaid. California Bill, Box L-2, Eaglerock, Los Angeles 41, Calif.

**CHEVROLET** Speed manual now available to enthusiasts desiring real "hotrod performance" from their 1937 thru 1948 Chevrolets. Complete data and photos for building honest 110 mph road car, 130 mph hotrod roadster. Every page worth the total cost of only \$2.00 postpaid. California Bill, Box L-2, Eaglerock, Los Angeles 41, Calif.

**CALIFORNIA** Speed equipment, doll 'em-up accessories, dual, single, mufflers, skirts. Save freight from California. Midwest warehouse. 25c for catalog. Von Esser's, 2840 No. Kedzie, Chicago 18, Ill.

**POWER** and speed equipment for all cars. Tops in heads, manifolds, cams, mufflers, etc. Save on Edmunds, Edelbrock, Offenhauser, Meyer, Weiland, or Knudson equipment. New illustrated list 25c. Chevrolet or V8 hopup instructions \$1.00. Give make. Alden Motors, Oakland City, Indiana.

**SPEED** Equipment Marine and automotive. We have only the best, made by leading southern California manufacturers including—Edelbrock, Meyers, Weiland, Winfield, Jahns, Offenhauser, etc. Complete line of high compression heads, dual manifolds, racing pistons, camshafts, dual ignitions, etc. Send 25c for illustrated catalog. So-Cal Speed Shop, 1104 S. Victory, Burbank, California.

**HIGH** Compression heads, V-8. More speed, acceleration, power. Offenhauser or Edelbrock \$75.00 complete set. Dual manifolds complete with throttle kit, fuel lines. Edelbrock \$49.00. Offenhauser \$55.00. Give make, model V-8. Catalog 10c. Clymer, Dept. B-73, 1268 So. Alvarado, Los Angeles 6, Calif.

## 2 AUTO SUPPLIES & EQUIPMENT

**PLATING** Outfits For Autoparts. Connect to a battery. No tanks used. Outfits furnished. Free particulars. Gunmetal Co., Ave. K, Decatur, Ill.

**AUTO** parts for all autos and trucks. Trans. motors, differentials, fenders, carburetors. Also Body Parts, Security Auto and Truck Parts, 1923-PS Grace, Chicago 13.

**REUPHOLSTER** Your own car or operate upholstery shop. Complete auto upholstery instruction manual \$2.00 Money Order. C.O.D. First Upholstery Service, 3439 Michigan Ave., Chicago, Ill.

**TIRES**, new and good used, all popular sizes for cars and trucks, bargain prices. Write today for free price list. Midwest Tire Co., 2012 Locust St., St. Louis 3, Mo. Dept. 5.

**AUTO** parts. Buy direct. Get dealers' prices. Represent us in your territory. Write requirements. Specify car make. Mechanics Auto Parts, Factory Warehouse, 3807-PS N. Ashland, Chicago 13.

**CARBURETOR** repair kits, electrical service parts, fuel pumps, etc. State requirements. Carburetor Service, 600 La-Prairie, Ferndale 20, Mich.

**THE A B C** of water injection. Complete information Free. Advanced Automotive Products, 563-7 Lake Road, Webster, N. Y.

**PAINT** your car with spray, brush or puff for \$2.95. Available in black, dark blue, gray, dark green, light green, maroon, tan. Shipped prepaid if money accompanies order, otherwise C.O.D. plus postal charges. M-H Products Co., 3625 South Grand Avenue, Los Angeles 7, Calif.

**SPEED Handbook**—The Original "Hop Up" publication! Easily increase speed, power, mileage to 30%! Non-technical information on engine tuning, Speed Data, Racing Secrets, carburetion, compression, formulae, balancing, fuels. How to build power equipment. Fast Conversions. "Hot Rods", economizers, superchargers, mufflers, manifolds, water injectors. Streamlining—Customizing methods. Photographs. Catalogues, etc! \$2.00. Almquist Engineering, Milford 17, Pennsylvania.

**PAINT** Your car two tone, yourself. Sufficient enamel; four fenders \$1.95. Instructions Free. Bass Co., B-31 W. 32 St., N. Y.

**MOTORISTS** save gasoline by Vacuumating overrich mixtures. Fits all cars. For free particulars write Vacuumatic, Dept. 1369, Wauwatosa, Wis.

**WELDING** for low-cost repairs on bodies, blocks, fenders. Adds to your profits. Easy with Hobart Welders. Free catalog. Write Hobart Welders, Box P-782, Troy, Ohio.

**CONVERTIBLE** Tops—Completely sewn. Easily installed. Reasonable prices. Free literature. Rio Top Company, 1370 Roanoke, Newport News 11, Virginia.

**CHEVROLET** Parts. Scarce motor, body, sheet metal parts. Grossman Chevrolet, Minneapolis, Minnesota.

**SAVE** gas! Instant starting. Power! "Lektro" spark intensifier. Easily installed. \$1.25 plus C.O.D. Guaranteed! State make car. Electronic Industries, Cleveland 11, Ohio.

**KILLS** Fires! Dries wires! New high-powered, ultra compact extinguisher only \$3.85. Free circular. United Technical Laboratories, Morristown 1, N. J.

**MELLO** TONE dual asbestos packed mufflers built in tone loud or quiet for Mercury dual set. Complete C.O.D. \$20.00. Singles for all cars \$5.00, \$8.00 chrome 18 inch tips, large hub caps, skirts. Dealers wanted. Jack Davis, 1220 South Robinson, Okla. City, Okla.

## 3 AUTO TRAILERS

**BUILD** Your own trailer! Save money! Have every feature you want! Plans for house, sport, camp and utility trailers. Catalog describing 9 models 10c. 15c in Canada and overseas. Jim Dandy, Box 125-B, Wausau, Wisconsin.

**TRAILER** Hitches. Demountable bar type for all new Cars. Also axles and frames. The Trail-A-Way Co., 25209 W. 8 Mile Rd., Detroit 19, Michigan.

**TRAILER** plans, parts, accessories. Complete line. Prompt delivery. Catalog 25c (coin); catalog plus booklet, "Trailer Building," 50c (coin). Marine Mart, Buffalo 7-A, New York.

## 4 MOTORCYCLES, BICYCLES, SUPPLIES

**WHEELS!** Build wagons, scooters, mowers, trailers, wheelbarrows, grocery carts, baby carts, play pens, baby carriages. 4" to 16". Free list. Trulsen Mfg. Co., 811 E. 31, Kansas City, Mo.

**MOTORCYCLISTS.** Chromium accessories. New and reconditioned motors. Complete Indian Parts. Expert motor rebuilding. Indian Motorcycle Sales, Kansas City 1, Missouri.

**WHEELS.** Tires, Tubes for Motor Scooters, Midget Cars, Wheelbarrows, and Industrial equipment. All sizes. Bicycle Parts, accessories. Largest stock in United States. Send dime for list. Cycle Transport Company, 1241 S. Michigan Ave., Dept. C, Chicago 5, Illinois.

**KING** Midget \$40.00 Briggs Stratton Motor \$15.00 3 1/4 h.p., outboard motor \$40.00. Fairbanks Morse 6 h.p. motor \$40.00. Parts for Hot Rod, Midgets and big race cars, send 25c in coin for our Exchange Bulletin. Dept. C. Behnke's, 5721 Leland, Chicago 30, Ill.

**PISTON RINGS** for all engines any size or age, trade discounts. Thomas, Dept. T-22, 1916 W. Valley Blvd., Alhambra, Calif.

**WHIZZER** & Cushman ground cams & High compression heads, more Speed & Power. Also Telescoping spring forks for motorbikes. Thomas, Dept. T-12, 1916 W. Valley Blvd., Alhambra, Calif.

**MOTOR** Scooters, bicycle engines. 120 miles gallon. Dime for catalog. Clymer, Desk B-75, 1268 So. Alvarado, Los Angeles 6, Calif.

**TELESCOPING** bicycle spring fork. The new Thomas Spring Fork is the only telescoping fork made for motorbike and bicycle. Absorbs all road shocks, makes riding velvety smooth \$9.95. Write for free illustrated folder. Jobber and dealer openings. Mercury Specialties Co., 1916 W. Valley Blvd., Alhambra, Calif.

**MOTORSCOOTER** \$7.50, midget racer \$10, motorbike \$5 less motors; Harley single \$40, Midget car \$55 complete. Motors \$4 up. Plenty brand new engines and surplus motorscooters. Over 5000 small tires 1 up. Mail order only. Send 25c for Big War-Bargain catalogue listing the above and hundreds of other bargains in motorscooters, motorcycles, midget racers, outboards, engines, etc. (35c by First Class Mail). Midget Motors Directory, Athens, Ohio.

**FLAT** rate repair manual for Harley-Davidsons. Gives flat rate charge for every operation. Every dealer, owner, mechanic needs this new book. \$2.00 postpaid. Clymer, Dept. B-FR, 1268 So. Alvarado, Los Angeles 6, Calif.

**HARLEY-Davidson** "45" engines. Gov't Surplus, rebuild with Generator and Carburetor. Few left, close out \$89.00. Clymer, Dept. B-7Z, 1268 So. Alvarado, Los Angeles 6, Calif.

**EASILY** build Professional Midget Racer, Motorscooter, Midget Roadster, or Midget Motorcycle from cast off parts. Plans, specifications for all four contained in illustrated handbook, 25 cents. Directory of bargain priced used parts and motors included free! Mid west, 3839 Drummond, Toledo, Ohio.

**MIDGET** Car with three-speed transmission—\$35. Cushman Motorscooter—\$15. Shaw Bicycle Motor—\$15. Harley-Davidson Motorcycle—\$15. Motorbike outfit—\$15. Rush 25 cents for special new catalog listing amazing bargains in motorscooters, used motors, tires, parts, midget cars, etc. Gail, 538 Erie, Toledo, Ohio.

**MOTO-Scoot**—\$35, Midget racer—\$15, Indian Motorcycle—\$30, Cushman Motorscooter with extra tire—\$20, Motors—\$3 and up, homemade Motorscooter—\$10. Send 25 cents for new catalog listing these and many other sensational bargains in used motors, wheels, tires, motorscooters, midget cars, motorbikes, etc. Associated, Box 1764-CS, Toledo, Ohio.

**SENSATIONAL** clutch operated Motorscooter \$49.75! You assemble from our factory finished kits. Uses any gasoline motor. Complete plans, literature—25 cents. Zipscoot, Toledo 6, Ohio.

**AIRCOOLED** engines aplenty cheap list 15c. Motorscooter plans 50c. Donz, Mount Ephraim, N. J.

**BICYCLE** motors. Save \$30. Factory rebuilt. Factory new motor guarantee. Nationally advertised make. Money back guarantee. Write today. A-1 Bike Motors, Box 267, Maywood, Calif.

## 5 AVIATION

**FREE!** How to fly cross-country—safely—how to land at airports—told in booklet "Happy Landings," sent to Pilots and Students. Please enclose 10c for postage and handling. Hangar Flying, Dept. (13K7), 112 E. Grove, Bloomington, Ill.

**VETERANS:** Be a pilot. Tuition paid under the G.I. Bill. Private, Commercial, Flight Instructor, Instrument, and Multi-engine Courses. Opportunities for part-time employment while studying. Ideal flying conditions. Write for information. Gottschalk School of Aeronautics, Adrian, Michigan.

**FAMOUS** "Zweng" manuals with examinations: Mechanics rating \$3.00; Flight engineer \$4.00; Navigation \$3.00; Link Instructor rating \$4.00. (Free catalog). Pan American Navigation Service, 12021-D3, N. Hollywood, Calif.

**AEROPLANE** tires, tubes, wheels, rims for all Farm machinery. Free list. Marvin A. Northrop Aeroplane Co., 500 Washington North, Minneapolis 1, Minn.

**AVIATOR'S** Type Sun Glasses, gold plate, green ground lenses, guaranteed, \$2.95, 10c postage. Flying goggles, not cheap plastic but glass lenses, metal framed, \$4.95. Aviator's type wrist-watch, sweep hand, \$7.95. Oxygen bottle, with regulator, hose, mouthpiece, filled with oxygen, \$5.95. (small size). 26" miniature airplane propeller, \$1.65. Summer helmet, \$1.00. Aero Parts Supply, Municipal Airport, Houston, Texas.



**PROPELLERS**—2-3 blade, snow-ice sleds, boats. Catalog. Standard Aircraft, Box 387, Ft. Worth, Texas.

## 7 ELECTRICAL SUPPLIES & EQUIPMENT

**FLUORESCENT** lights. Make your own... ideal for home and shop. Complete electrical parts for 20-watt fixtures with detailed instructions. Also larger sizes Postpaid only \$2.00. Write Fluorokit, 332 E. Reservoir, Milwaukee, Wisconsin.

**ELECTRIC** Fans? Assemble your own. 16" correctly balanced aluminum fan blade,  $\frac{1}{2}$ " bore, \$2.25. 18" all welded guard, \$2.50. Use any ordinary motor. No COD. Ted Riseman, 207 N. Fifth St., Springfield, Illinois.

**BUILD** Model train motors inexpensively. Piper, Box 182, Royal Oak, Michigan.

**LAMPS.** Build own originals, parts wholesale any amounts. Catalogue 10c. Brown Lamp Co., No. 501, Wellston, St. Louis 12, Mo.

**ELECTRICIANS.** Save money on one hole pipe straps. Price per 100,  $\frac{1}{2}$ "—\$1.82,  $\frac{3}{4}$ "—\$2.35,  $\frac{1}{2}$ " EMT—\$1.68. Sturdy design, strong cast aluminum. Peasley Products, Inc., 151 Connecticut Ave., Bridgeport 7, Conn.

**ELECTRIC** Pencil: Engraves all metals. \$1.00 postpaid. Beyer Mfg., 229-C Dixon, Uniontown, Penna.

**ELECTRIC** Motor shop tools: Carbide tipped inside commutator boring, sanding, \$4.75. \$3.75. Featherweight winding guns, \$6.00. heads, \$49.50. Stator vises, \$22.75. Combination insulation folder and tin brake, \$32.50. Others, R. Doyle, P. O. Box 224, Vista, Calif.

**LAMP** parts wholesale. Large variety available, for building, repairing, or remodeling. Order in any quantity. New 1948 catalog, 10c. Gearon Company, 27H South Desplaines, Chicago.

**LAMPS**—All parts to build or repair. Illustrated catalog 10c. Gyro Lamps, 5402-B Clark, Chicago 40.

**RECTIFIERS:** Ramyr Selenium Platers, 10, 30, 50, 100 amp sizes. Immediate shipment. Complete line of bronze baby shoe mounts. Write for list. Hollywood Bronze Supply, Dept. S, 1770 N. Vermont, Hollywood 27, Calif.

## 8 WELDING, SOLDERING

**POWER-Welder** new combination AC Welder-AC Power Plant. Portable, makes you independent of power lines. Gives you Welding, plus Power for tools, lights, motors... anywhere. Free catalog. Write Hobart Welders, Box P-784, Troy, Ohio.

**WELDER**—New portable champion special Transformer Welder; 110/220 volts. AC. 8 heat stages. Welds, brazes, solder, cuts all metals. Complete with electrode holder, helmet rods, carbons, fluxes, cables. Also special Flame Weld Torch. Easy to use. Full directions. Splendid for shop, farm and home repairs. Guaranteed. Only \$27.50. Money back guarantee. Also resistor model. Now \$14.95. Magic Welder Co., 239 PS Canal St., New York, N. Y.

**WELDERS** for all requirements. Free catalog. Write Hobart Weld, Box P-785, Troy, Ohio.

**TRANSFORMER** Welders 110 V. Welds  $\frac{1}{2}$ " Steel \$29. Morris Welding Service, 1850B State, Schenectady 4, N. Y.

**WELDING.** a profitable trade. Learn quickly at best equipped school in U. S. Demand for trained men. Write Hobart Welding School for free catalog. G.I. approved. Box P-786, Troy, Ohio.

**RADIATOR** repairing pays big. Excellent spare time work easily learned. Radiator Service and Supply, McBain, Mich.

**BUILD-UR-Own** Portable arc welder. Save \$350. Easy with Hobart Generator plus auto engine. Free instruction book. Write Hobart Welders, Box P-783, Troy, Ohio.

**WELDER.** cutter combination. Portable, electric, 110 AC-DC. Welds, brazes, cuts, melts, solders, heat-treats. Welds metal up to  $\frac{3}{16}$ " thickness, using to  $\frac{3}{32}$ " rod. Cutter cuts all metals, even hardest tungsten. Starting welding materials, complete instructions included. Ideal for garages, repair shops, farm and home workshops, etc. Send no money. Welder and cutter both only \$12. C.O.D. 5-day money back trial. Or write for free folder. California Technical Products Co., Dept. F-7, 448 South Hill St., Los Angeles 13, California.

## 10 MACHINERY, TOOLS, SUPPLIES

**DRILL GRINDER**—Grinds drills to factory accuracy. Calipers with direct reading scales. Circle cutters. New Tool grinder. Lowest prices. Free literature. Factory, 811-A East 31st, Kansas City 3, Mo.

**POWER** Tools. Build your own with Lewis Castings. Save up to 80%. Complete castings, materials and blueprints supplied for 23 woodworking and metalworking tools. Free catalog. Write today, Lewis Machine Tool Co., 3217 Union Pacific Avenue, Dept. S, Los Angeles 23, California.

**SEWING** Machine handcraft — Your sewing machine equipped with Bright Bit will cut wood, leather, etc. Simple—smooth cut—no drilling—no dust—Simple chisel needle replaces ordinary needle to produce precision cutting. See May issue, American Legion Magazine. Proof 25c. Sewing Handcraft \$1.00; 3 chisels \$1.00. Bright Bit, East McKeesport, Pa.

**WAR** Surplus in small tools for machine shop—Send 15c for bulletin. Travers Tool Co., Dept. S, 5 Court Square, Long Island City 1, New York.

**OXYGEN MASKS.** 40c postpaid. (Coins or stamps) Gov. Surplus 14A10. Convertible dust-paint respirators. Daugherty, 123 So. Pecos, San Antonio, Texas.

**POWER** master gear reduction unit converts Bandsaws to heavy metal sawing. Conveyers, Farms, Production, Hobby Shops. Ratio  $7\frac{1}{2}$ -1. Use with  $\frac{1}{4}$  to  $\frac{1}{2}$  motor—14 lbs. \$9.95. Butt-welded Metal cutting saws 14c ft. Free circular. Power Master Sales, 354 Beale St., Quincy 70, Mass.

**CONCRETE** Block machines from \$39.50. Catalog free. Concrete Equipment Company, 5466 Gravois, St. Louis 16, Missouri.

**SHEBEL** Saw Filer, \$7.50. Files all saws. Free trial. Circular, 730A So. 2nd St., Milwaukee 4, Wis.

**BACK** geared metal and wood cutting 12" band saw, 6" jointer, ball bearing, 47" long. Ball bearing spindle shaper, 15x20" table, 8" bench saw, tilting table, ball bearing. Lowest priced line of high grade tools on market. Free catalog. Backus Machine Co., Boyd, Wisconsin.

**HOME** Lathe owners—Build your own attachments. Send for picture, sample of work and list of blueprints. Cut gears, ratchets, etc. Make neat screws easy way. The Home Shop, 415A Raymond Ave., Glendale 1, Calif.

**MACHINE** tools released for private industry:—10" Bench lathe \$190. 14" Loose change lathe \$160. 16"—\$180. 14" Quick change \$440. some \$350. Hand Miller \$180. Back Geared Miller \$260.—22" Shaper \$380. 3 ft. Planer \$220. 6 ft. \$510. Lincoln welder \$180. Air compressor \$50. D.C. and A.C. motors. Spray guns 10. Money back guarantee. Conversion Parts Co., 277 Adams Street, Boston 22, Mass., U.S.A.

**CHUCKS.** (Genuine Westcott) Independent, Universal, threaded  $1\frac{1}{2}$ "—8 for South Bend, Atlas, Logan, Clausing, Craftsman lathes. Also other chucks to 16". Top value. Free literature. Westcott Chuck Co., 3700 Walnut, Onelda, N. Y.

**16" AND 26"** size jigsaws. Ten Dollars & Fourteen Dollars, mail money order. Shellington Machinery, 2055 W. Hunting Park Ave., Phila. 40, Penna.

**120 GRIT**  $9\frac{1}{2}$ x $7\frac{1}{2}$  hole combination fiber discs carborundum 3m behr manning 20c each. Discount for quantity 9x11 sheets 80-100-150 Grit popular brand \$8.00 per hundred. Satisfaction guaranteed. Joseph Herron, Herron Sales Service, 2607 Oak Park Ave., Cleveland 9, Ohio.

**BAND** Saw—Special \$14.95. Ideal for hobbyists & Home Workshop. Circular Free. Woodcraft Tools Inc., 147 E. Lake, Minneapolis, Minn.

**DRILL GRINDER** for twist drills \$2.95. See ad on page 244.

## 12 FARM MACHINERY

**NEW** airplane tires, tubes, wheels, bearings, spindles. For harvesters, implements, lowbeds. Free pictures. World's largest stock. Airplane Tire Company, Dept. 20, Box 89, Merced, California.

## 14 BOATS, OUTBOARD MOTORS, ETC.

**FULL** size, cut to shape boat patterns, blueprints,  $7\frac{1}{2}$ —38 feet. Illustrated "Build a Boat" catalog, 10c (coin). "How to Build Boats" book, \$1.00. PolyWog Houseboat Plans \$10. Cleveland Boat Blueprint Co., Dept. A-77, Cleveland, Ohio.

**OUTBOARD** motors—good values, used motors. Also used parts for most makes and models. Crandall-Hicks Co., 912 Commonwealth, Boston, Mass.

**SAILS.** Canvas, wingdope, boat builders equipment, stainless steel rigging, etc. Alan-Clarke, 96 Chambers, N. Y. 7, N. Y.

**MARINE** fittings, accessories. Thousands of items (pictured, priced). Prompt delivery. Catalog \$1.00. Marine Mart, Buffalo 7-A, New York.

**OUTBOARD** adapter for surplus life rafts. Plans & Complete information \$1.00. Jungle Jim, Rt. #4, Box 70, Corpus Christi, Texas.

**MARINE** conversions for Ford and Jeep engines. Catalog 10c. Lehman Manufacturing Company, Department A, Newark 2, New Jersey.

**P38 DROP** Tanks, steel, new, 10 ft. or 6 ft., \$9.95. Free picture. Anzio Boat Co., 89v, Merced 3, California.

**AIRPLANE** Jettison tanks—streamlined, 10 $\frac{1}{2}$  Foot, tear drop shaped, 165 gallon, 20 gauge steel, weighs 75 pounds, ideal for boats, etc. \$12.50, \$9.75 each three or more, freight prepaid. No C.O.D. orders. Tanks shipped halves nested with gasket. Bolts not included. General Sales, 203 Market S.W., Grand Rapids 3, Michigan.

**BOAT** plans, kits. See display advertisement page 247. Marine Mart, Buffalo 7-A, New York.

## 15 ENGINES, MOTORS, ETC.

**WINDING** Data, listing 225 motors, single and three phase, \$1.00. Motor Data, Box 7631, Kansas City 3, Mo.

**ELECTRICAL** repair men, send for literature on Motor Winding tester and A.C. motor winder. Motor Industries, Quincy, Illinois.

**RANGER** Engine—Aircraft—All new in original case. 570 HP, 12 cyl. V type. Air-cooled. Engine Spec. No. 177. Complete with spark plugs. Original Government cost over \$12,000.00 each. Special offer \$200. Crated weight 1200 lbs. No C.O.D. Write for complete description. "Amazing Bachman's." Dept. PS, 23 Herman Street, Rochester 5, N. Y.

**GAS** drive arc welders. "Build-Your-Own." Portable. Get profitable jobs anywhere. Save \$350 with Hobart Generator plus auto engine. Free instruction book. Write Hobart Welders, Box P-787, Troy, Ohio.

**WATER**—motors all sizes for any purpose. Rotary and Semi-rotary. Duplex Motors, Burlington, Iowa.

## 18 BODY-BUILDING COURSES

**BARBELLS!** 95 pound set \$9.80; extra plates 9c pound. Send for free course and catalog. Bur Barbell Co., Lyndhurst, N. J.

**BAR-BELLS.** Dumbbells. Exercise equipment. Courses. Free booklet. Good Barbell Co., Reading, Penna.

## 19 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY

**SINKER** molds for making your own sinkers. Several styles, many sizes. Free illustrated folder. Reading Instrument Co., Box 78, Reading, Pa.

**"SHOTGUNS"**—"Rifles"—"Handarms"—"Ammunition"—"Rods"—"Reels"—List 10c. PS-Rudolph's, Atchison, Kansas

**BOWS**—Arrows, write headquarters for Archery equipment. Quality products. Popular prices. Catalog 10c. Large illustrated hand book instructions, aiming and shooting, 50c. Archery, 617-A So. State, Chicago 5.

**180** PAGES antique and modern pistol, sword, etc. values, 50c. Robert Abels, 860 $\frac{1}{2}$  Lexington Ave., New York 21.

**5,000** BARGAINS, firearms, binoculars, war relics, catalog 40c. Smith Museum, Runnemede, N. J.

**SPECIAL:** 20 assorted spinners for trout, bass, or pan fish. Postpaid \$1.00. Dept. 10, Box 313, Lewiston, Idaho.

**BULLET-Proof** Vests—Weight 5 Lbs. Will stop ammunition from 22 slug to Tommy-gun bullets. Wonderful protection! Sizes 38"-60" \$150. Postpaid. Philadelphia Sales Co., 5800 Springfield Ave., Phila. 43, Pa.

**SEND** 10c for list 100 used guns. Frayseths, Willmar, Minn.

**SHOTGUNS.** Rifles, Revolvers, Over 500 Modern, Obsolete, Also Cartridges, List .10 coin. Ed Howe, 26 Main Street, Coopers Mills, Maine.



## FIELD GLASSES, TELESCOPES, ETC.

**TELESCOPES.** Binoculars. Microscopes. —big bargain catalog free. Brownscope Company, 24 West 45th Street, New York.

**CASES.** New for 7x50 and 10x50 binoculars all makes. \$4.95 postpaid. Max Zweig Sons, 937 D. St. N.W., Washington, D. C.

**MICROSCOPE.** 75 Power. achromatic objective, standard optical threads. \$19.95. Free folder. Rowe Co., Dept. 1, Box 1, Brighton Station, Rochester 10, N. Y.

**POWERFUL** Astronomical telescopes easily made. Perfect lenses and instructions; 100 power \$3.00, 100 and 200 power \$4.00, 100, 200 and 400 power \$6.00. Clear vision and full power guaranteed. Instructions alone 10c. Suffolk Science Service, Manorville, N. Y.

**GOVERNMENT** Surplus. Terrific bargains. telescopes, binoculars, lenses, prisms, send stamp for catalogue. G. Jaegers, 123-26 Rockaway Boulevard, South Ozone Park 20, New York.

**ASTRONOMICAL** Telescopes, binoculars, microscopes; Bought, sold, repaired. Books. Lists 10c. Rasmussen-Reece, Amsterdam, N. Y.

**TERRESTRIAL** eyepiece for astronomical telescopes \$3.00 postpaid. Suffolk Science Service, Manorville, New York.

**ASTRONOMICAL** terrestrial telescope lens kit. 50x—100x—200x—400x powers \$3.00. Microscope lens kit 50x—100x—200x—400x—800x \$2.00. Postcard brings plans. List outstanding optical values. Pfeegor Optical Co., P.S.-7, Sunbury, Pa.

**POWERFUL** astronomical Refracting telescope, equatorially mounted, all metal, two eyepieces, \$16.50. Bluhm Optical Lab., 4213 Gifford Ave., Cleveland 3, Ohio.

**TELESCOPES** 17 power, 36 inch long. Precision ground lenses. Satisfaction guaranteed or money refunded. \$2.50 postpaid. Criterion Co., Dept. P.S., 438 Asylum St., Hartford 3, Conn.

## OPTICAL

**CONTACT** lens manufacturing information and supplies. Morosco Contacts, 19148 Marx, Detroit 3, Michigan.

## 24 DOGS, BIRDS, PETS, RABBITS

**RAISE** rabbits. Market provided, breeding stock furnished on Production Pay Plan. Literature 25c with hutch plans \$1. Hansen's Rabbit Institute, 1347 Miller Avenue, Salt Lake City 6, Utah.

**RAISE** Chinchilla rabbits. Year-round money-makers from furs, meat, breeders. Experience unnecessary. Write today. Willow Farm, Sellersville 16, Pa.

**\$250 MONTHLY.** Raising Angora Rabbits. Particulars free. White's Rabbitry, Newark, Ohio.

**\$5,000 YEARLY** possible raising Angora rabbits our Co-operative marketing plan. Associated Angora Breeders, Stanton, Cal.

**\$3000** Yearly raising pedigreed and registered Angora Rabbits. Vaughn's Rabbitry, Otley, Iowa.

**ANGORAS.** Giant Chinchillas, white giants—World's most profitable rabbits. Finest pedigreed, heavy-producing, prize-winners. Literature free. Grinsteads, Edwardsville, Illinois.

**RAISE** Guinea Pigs. Make money at home. Big demand. Booklet free. Taylor, Box 426B, Hapeville, Georgia.

**REPTILE** catalogue 10c. Current bulletin 5c. Golden Hamsters \$2.75 pair; Chameleon 25c. Quivira Specialties, Topeka, Kansas.

**WRITE** for descriptive circular "Angora Wool Growing." House of Angora, Springfield, Illinois.

**GOLDEN** Hamsters. Profitable. Interesting trio \$7.00. Probert, Box 315, Valdosta, Ga.

**SEE** Golden Hamsters ad page 30. Shows picture of hamster.

## MILK GOATS

**RAISE** Dairy Goats. All about goats and goat milk in big, illustrated monthly magazine. Sample copy 25c. Special introductory year subscription only \$1 (regular \$2 a year). Booklet, "Primer for Goatkeepers". Free on request. Dairy Goat Journal, Dept. 568, Columbia, Mo.

## FARMS, OTHER REAL ESTATE

**GOOD FARMS—Ranches.** Washington, Minnesota, Montana, Idaho, Oregon, North Dakota. Dependable crops, favorable climate. Write for literature, lists describing typical farm opportunities. Specify which state. J. W. Haw, 120 Northern Pacific Ry., St. Paul 1, Minn.

**STROUT'S** Farm Catalog—Free! Many equipped. Reduced Prices! Over 2800 bargains—Coast to Coast. Write Today. Strout Realty, 255-ZB—4th Ave., New York 10, N. Y. 20 W. 9th St., Kansas City 6, Mo. 453 S. Spring, Los Angeles 13, Calif.

**"ALASKA."** We will endeavor to answer your questions regarding homesteading, farming, hunting, employment, etc. in Fairbanks area. Mail your questions and \$1.00 to Wolf Brothers, Fairbanks, Alaska.

**OZARK** Lands for All purposes. Actual river frontages, 5 acres \$90.00 and upwards. Free list and literature. Hubbard, 424-H, Minnesota Ave., Kansas City 4, Kans.

**INTERESTED** in California farming? Expert and reliable information on any question. Personal reply. \$1.00. Farm Service, 1185 Glen, Berkeley 8, Calif.

**ALASKA.** The last frontier. \$1.00 brings up-to-date book on homesteading land, hunting and trapping, highway facilities, prospecting and mining, cost of living, etc. Write Alaska Information Service, Box 1372, Anchorage, Alaska.

**CHEAP** Homes, stock, dairy, garden, fruit, poultry farms, for retiring, strong, sick, folks. For hunting, fishing, longevity, health, happiness in scenic, mild Ozone, write G. W. Starr, Ozone, Ark.

**TEN** acres good land \$250, \$10 down, \$10 monthly. R. W. Stewart, Inverness, Florida.

**CALIFORNIA'S** new oil field, \$60. Nearby lots 50x150; Share in group drilling. Delker, 2219 Venango, Phila. 40, Penna.

**LOTS \$300—convenient** payments. California's finest garden section. On Morro Bay's scenic shores. Wonderful fishing, hunting, boating, bathing. Fertile soil, softest water, temperate climate, congenial community. Free literature. Richard Otto, Dept. Z, San Luis Obispo, Calif.

**OZARKS;** Home buyers, investors. Free pictures—Write Armstrong, Shook, Mo.

## 32 PROFITABLE OCCUPATIONS

**DETECTIVES** Earn Big Money. Excellent opportunity. Detective Particulars free. Write, Wagoner, P-125 West 86th, N. Y.

**\$5000.** from half acre growing Ginseng, seed supplied. Crop bought. Particulars 10c. Associated Growers, 1109 Corydon Ave., Winnipeg, Canada.

**\$40.00 WEEKLY.** Made growing mushrooms. Fresh. Dried. Dominion Patent 331,583, free spawn. North American, 169Y Yonge, Toronto, Canada.

**ANNOUNCING** home study course in commercial baking. Practical basic training. Good field for those with aptitude. Nearly depression proof. Send for Free booklet, "Opportunities in the Baking Industry." National Baking School, 1315 Michigan Ave., Dept. 1723, Chicago 5, Ill.

**IF** you work in a factory or shop, you are passing up the opportunity of a lifetime to build a steady Extra Income by selling subscriptions to Popular Science Monthly to your fellow employees. For free kit and complete instructions write on a postcard to—Manager of Agents, Dept. A148, Popular Science Publishing Co., Inc., 353 4th Ave., New York 10, N. Y.

**1948 LEATHERCRAFT** Supply catalog 10c. Art Craft Supply, 1205 Throckmorton, Fort Worth, Texas.

**HYDROPONICS** soilless vegetables, cheap chemicals. Free information. Box 57, Bristol, Virginia.

**EARTHWORMS.** Send \$1.00 for Revised Booklet on Soil Building & Better Composting. Coolville Earthworm Farm, Coolville, Ohio.

**START** lamp business in your home, basement, garage. Profitable, fascinating, easy to learn. Illustrated course teaches you. General instructions and wholesale catalog. \$1.00. Gearon Company, 27H South Desplaines, Chicago.

**METALLIZE** baby shoes and other non-metallic articles. Fascinating work. Big profits. Shuplate, Box 1388, Lawton, Okla.

**MAKE** Soaps, chemical cleaners, synthetic detergents. Easy instruction booklet. 100 formulas. \$1.00 U. S. or foreign. Brown, 9111-D Hoyne, Chicago 20.

**FOREIGN** Employment??? July directory, bulletin 39-A listing major work projects overseas. Foreign Service Institute, Box 3934-C, Miami 24, Fla. \$1.00 or C.O.D.

## 33 BOOKS, PERIODICALS, ETC.

**MAGAZINES** (back dated)—foreign, domestic, arts, Books, booklets, subscriptions, pin-ups, etc. Catalog 10c. (refundable). Cicerone's, 863 First Ave., New York 17, New York.

**USED** Correspondence courses and books bought, sold, rented and exchanged. Catalog Free. Lee Mountain, Pisgah, Alabama.

**BIG** Sparetime profits taking magazine subscriptions. Complete supplies, confidential catalog free. Cassell Publishers Service, Westfield, New Jersey.

**"ADULT** bookalogues." 25c. Fifteen—\$1.00! Free catalogs! Hirsch, Spring Valley 3, N. Y.

**COMIC** books. 18 for \$1.00 all different. Write to Gilco, 141-14 70th Ave., Flushing 1, N. Y.

**MOTORCYCLE** News, monthly. Yearly subscription \$1.00. Latest worldwide information. Motorcycle News, 5424-B Sawyer, Chicago 25.

**1948 CATALOG,** wholesale directory. 10c. Latshaw Sales, Sunnyside-C, Indianapolis 44, Ind.

**BACK-DATE** Magazines. Books. Specific issues—years. Arkell's, Tarzana 2, Calif.

**FREE** books, send 50c, receive 96 page guide to 5000 books absolutely free. Smallwood, 735 West Broadway, Ocala, Florida.

**POLICE—Ju-Jitsu.** Wrestling. Boxing. Swim. Magic card tricks. Ventriloquism. Love guide 30cts. List free. Lefferts, Box 48, Brooklyn 25, N. Y.

**ADULT** Books—Revealing—Unusual—fascinating. Fifteen—\$1.00. Kogan, 1032 SP Church Annex, New York 8.

**STOCK** Market—Latest research discloses factors timing market highs, lows, panics to exact dates. Send \$10 to Orpha Publishing Company, Dept. J-20, P. O. Box 279, Berkeley, California.

**"HOW** To Drive an Automobile." New. Illustrated. \$1. Szafarz, Box 705N, Pawtucket, R. I.

**MIDGET** Bible, illustrated. World's smallest "lucky" Bible. Over 200 easily read pages. Size about 1"x1 1/4". \$1.00. Jimray Sales, Box 592, Whiting, Ind.

**BOOKHUNTERS!** All subjects. Send wants! Jaher Book Service, 620-K East 178 Street, New York 57.

**HORSE** Racing books 'systems,' etc. Catalogue Free. Charles Hall, Sepulveda, Calif.

## 35 MAGIC TRICKS, PUZZLES, ETC.

**MAGICIANS'** Gamblers' secrets exposed. Cards, Dice, Punchboards, Slot Machine. Catalog 10c. Book Co., Box 571, St. Louis 1, Mo.

**WORLD'S** largest professional magic shop, keeps you in touch with latest tricks. To receive mailings, send 35c for new catalog. Holden's, 220-P West 42nd St., N. Y.

**TRICKY** Magic Matchbox. It turns around, it stands, it opens. Confuses, amuses everyone, easy to do. Free To You if you send 25c for Big Illustrated Catalog of 425 Magic Tricks. Magician, 2463-D Kensington Ave., Phila. 25, Pa.

**LEARN** magic. Ventriloquism. Mind-reading. Write for particulars. Quackenbush, Big Flats, N. Y.

**MAGICIANS'** Headquarters — 400-Page Professional Catalogue, pocket, parlor, stage tricks. World's finest magic. Send \$1.00 for Catalogue (refunded first \$5.00 order). Kanter's, S-1311 Walnut, Philadelphia 7, Penna.

**500** TRICKS. Send only 10c for Douglas' famous 112-page Catalog 500 Tricks. New magic for amateur, professional. America's fastest service for 25 years. Douglas Magicland, Dept. 2, Dallas, Texas.

**AMAZING** bargain! "Seven Mystifying Tricks," catalog and interesting Reno souvenirs 10c. Vancamp, 453 Reno Ave., Reno, Nevada.



THE Mysterious headless match trick, 25c with pamphlet of magic and joke items. Powell's, P.O. Box 2155, Potomac Station, Alexandria, Va.

ITCHING, Sneezing Powders, Eighteen other tricks. Free with Jokers' catalog 25c. 2404N15, Philadelphia.

HYPNOTISM! 25 Lesson Course, \$1.00. Monarch, 38-S Jefferson, Auburn, New York.

EARN money in any crowd. Call names of strangers, tell unspoken questions. Professional course mindreading, faked spiritualism, etc., \$1 postpaid. Reiss, 3017-R Ocean Parkway, Brooklyn 24, N. Y.

LARGE 160 page catalog, just published, 35c. We have supplied the best tricks to beginners and professionals for 38 years. Chicago Magic Company, 2300-L No. Mason Avenue, Chicago 39.

BE a Magician. Large professional magic catalog of latest tricks, 35c. Ireland, F-109 North Dearborn, Chicago.

MAGIC tricks, fun novelties. Illustrated lists 10c. "Marean," 2200 Gorden, Hopewell, Virginia.

VANISHING Quarter trick and catalog 25c. Sterling Magic Co., Royal Oak, Mich.

ENJOY yourself make friends with Magic 40 tricks \$1.00. Magic Package 25c. Lindhorst, 612 E. Pine, St. Louis, Mo.

### 36 GAMES, ENTERTAINMENT

HOME Model Slot Machines and Coin Operated Games. Write for catalog. Webb Distributing Co., Dept. P4, 6 South Kedzie Ave., Chicago 12, Ill.

### 37 COIN COLLECTING

GET profit and pleasure in collecting old coins. Send 10c for 56 page illustrated coin catalog. You'll be delighted with it. Send for it now. B. Max Mehl, 374 Mehl Bldg., Ft. Worth, Texas. Largest rare coin establishment in U. S. Established 48 years.

FREE! Foreign coin, banknote and Coin Collectors' Illustrated Catalog to approval service applicants. Send 3c postage. Tatham Coin Co., Springfield-D50, Mass.

COMMEMORATIVE \$1½ — Columbus, Washington, Cleveland, Stone Mountain, \$1.50 ea. Illustrated Catalogue 25c. Norman Schultz, Salt Lake 9, Utah.

BAGDAD strange rare coins. Nine different including silvers, \$2.00. Edward Basry, Bagdad 40, Iraq.

U.S. coins lowest prices. Send stamp for lists. Hutchinson, 3463 I Street, Philadelphia 34, Penna.

START A collection, twenty different dated Indian head cents \$1.00. E. Walton, 7 Water, Boston 9, Mass.

### 38 OLD STAMPS WANTED

RECEIVE \$1 worth of desirable stamps of your choice from our gigantic selection. Send only 25c to Cosmopolitan Stamp Co., 1457 Broadway, New York.

### 40 STAMP COLLECTING

DEALER'S Wholesale Catalog. Postage 3c. Franksco, 5031 Queensbury, Baltimore, Maryland.

ZOWIE-E-E! A Barrel of Fun for only a Dime! 500 United States Stamps—Absolutely unpicked and unsorted. Just as received from church missions. Many varieties, including large commemoratives, airmails, high denominations up to \$5.00! Stampdom's biggest package of fun, and you might find something really valuable!! Price only 10c to serious approval service applicants. Money back if not delighted. Illustrated bargain lists with each order. Mystic Stamp Co., Dept. 55, Camden, New York.

WOW!! \$10.00 Worth Of Fun—Only 10c! What a treasure hunt! Big package 500 Foreign Stamps from foreign missions, other sources. Includes Stamps from Africa, South America, Free French, Somali, Palestine, etc. Includes airmails, commemoratives and stamps worth up to 50c. This offer sent for 10c to Approval Applicants only. Jamestown Stamp Co., Dept. 5, Jamestown, N. Y.

128-PAGE United States Catalog, 1,000 illustrations, 10c. Harris & Co., 204 Transit Bldg., Boston.

200 DIFFERENT Stamps—cataloging up to 15c each—only 3c to approval applicants! Littleton Stamp Co., Littleton 47, N. H.

NICARAGUA "Tin Pan Alley" Diamond, Ecuador showing George Washington, and American Flag in natural colors. Fezzan, Trieste, "American Army" stamp First U.S. Commemorative, \$100.00 Shanghai, Corsica, Anzac, Antique, others all 5c approvals. Capital Stamp Co., Dept. 10, Little Rock, Ark.

"CONFEDERATE-States" twelve different unused 10c approval applicants only. "Stamps", Box Eighty-Seven, Albany 1, N. Y.

FREE—\$25.00 Stamp collector outfit—Finest, most complete outfit ever offered: Large Scott album, valuable collection of 1050 different stamps, Airmails, Odd-shapes, Hi-values, "Stamp finder," Watermarker, magnifier, perf-gauge, tongs, and hinges. Actually over \$25.00 value absolutely free when regular customer. Mail application now for Foreign approvals. Bargain Stamp Service, Dept. A, Santa Ana, Calif.

FREE! Crystal-Mount Sample, Harrisco, 204 Transit Bldg., Boston, Mass.

UNITED STATES approvals complete coverage fine quality, attractive prices. Seminole Stamps, Box 1138-S, Coral Gables, Florida.

25 DIFFERENT India—3c with approvals. Premium with purchases. Brandwein Stamp Co., Box 92-P, Bayonne, N. J.

FREE. Irish commemorative collection, including Rebellion issue with approvals. Raymax, 123-X William St., NYC 7.

BRITISH, Spanish, French Colonies, Vatican, Hitler heads, and airmail packet, free with approvals. Pan-American Stampco, Box 145, New York 33, N. Y.

31 DIFFERENT with George Washington Stamps, from Brazil and Ecuador; Pirate Island; Victory issue; Medical set; others—all 4c with approvals. Grayson Stamps, Sherman, Texas.

FREE! Tiny Chinese "Midget" War set. Approvals. Seminole, Leeds 10, Ala.

FREE! Complete Balkan aviation set with approvals. Beaman, Leeds 10, Ala.

FINE Approvals. Fast, personal service. What countries do you prefer? I'll send their stamps. Milton Skinner, 438 Locust, Long Beach 12, Calif.

REMOVE Stamps From Paper With "Stoff," 25c. L. White, Box 922, Pittsfield 2, Mass.

SOUTH America and Cuba packet. Free to approval applicants. Martin, Box 1128, Miami Beach, Florida.

FREE—Famous Americans set, plus Flag set, plus the National Parks set, plus the Presidential set to the \$5. A total of 90 stamps absolutely free to customers for our unsurpassed United States or Foreign selection. Send 3c postage for 15 of the above mentioned stamps and full particulars. Triboro Stamp Company, 145 Nassau Street, Dept. 207, New York.

CHOICE of 35c worth of Stamps from our first U. S. Selection Free to applicants enclosing 3c postage. Large Selection to choose from. Act now! S. D. Engel & Co., 38 Park Row, New York.

FREE Pricelist, 100 countries, 250 different packets. Charles Chase, R.F.D. 1, North Conway, N. H.

SENSATIONAL! Set Capejuby, Brunei, Perak, Honduras, Paraguay, Nigeria and over 100 different others. Everything 10c with approvals. O'Keefe Stamp Co., 7517 Merrill Ave., Chicago, Ill.

POSITIVELY Greatest Free Offer—Latest Scott's International \$6.00 stamp album—covering entire world, contains 36,000 illustrated descriptive spaces; Scott's 1948 Standard \$7.00 catalogues "Philately's Encyclopedia"—absolutely free to applicants for foreign approvals becoming customers. Plymouth Specialty Company, Dept. A3, Bell, California.

15 DIFFERENT U. S. over 40 years old. 10c special to applicants for our bargain U. S. approvals. Will Portney, 1806B East 22 St., Brooklyn 29, N. Y.

STAMPS 100 Years Old. Every collector should have at least a few stamps nearly 100 years old. Although hard to get, we offer a wonderful selection of ten old 19th century foreign stamps and also the blue re-issue of the 100 year old first U. S. stamp, the famous 5c Franklin. All for only 10c. Kindly state whether approvals shall consist of U. S. or Foreign Stamps or both. Globus Stamp Company, 268 Fourth Avenue, New York 10, N. Y.

WORLDWIDE Different: 200-25c; 500-60c; 1000-\$1.50; 2000-\$4.25. Beacon Sales, Maynard 3, Mass.

PENNY Approvals that satisfy. Neil Gronberg, Box 54418, Philadelphia 43, Pa.

U. S. 797 SPA Sheet only 5c to applicants for U. S. approvals. M. Haycock, 333-85th St., Brooklyn, N. Y.

25 NETHERLANDS free. Approvals. Country Stamps, Rt. 76, B. 800, Tacoma, Washington.

EARN money at home. Operate your own mail order stamp business. Details free. Kelly, U-9544 Whitcomb, Detroit 27, Michigan.

FIRST day covers on approval. Bob Knobel, 1918 S.W. 12th Street, Miami 35, Florida.

FLAG Stamp Free With U.S. Approvals. E. Wenigman, 929 Oakdale, Chicago.

5 SETS—Five countries—Triangle, Orchid, Maps, Animals. With approvals 5c. Arthur Wirth, Norwichtown 2, Conn.

ETHIOPIA, Vatican, Free French and Roosevelt triangle, free to approval applicants. Rare Stamp Co., Box 121, Miami 38, Florida.

IRAQ approvals, \$1.00 to \$5.00 deposits. Fifty-one rare covers from here \$5.00. Seventeen \$2.00. (U.S.A. Money). Edward Basry, Bagdad 40, Iraq.

VICTORY Packet Free—Includes stamps from Tanganyika—British Cayman Islands—Animal—Scarce Babyhead—Coronation—Early Victorian—Airmail—Map Stamps—Including big illustrated catalogue. Send 5c for postage. Gray Stamp Company, Dept. P. R. Toronto, Canada.

77 DIFFERENT United States. Many commemoratives included. 17c to approval applicants. Standard, 3817 Sackett, Cleveland 9, Ohio.

75 UNSORTED Newfoundland 25c. Real value. Mayfair, Regal Road, Toronto 10, Canada.

FIVE beautiful Spanish Airmails, catalogue 45c, only 10c with approvals. Standard, Box 43, West Farms, New York 60, N. Y.

FREE. Triangle, Roosevelt, Vatican, Ethiopia, Hitler Heads. Request Approvals. Florida Stamp Company, Box 807, Miami 5, Fla.

HISTORICAL Collection! Cavalry charge! (Bulgaria) Flaming sword! "Ireland" Big She-Wolf! "Italy" (Legionnaires) Field Marshal! (Pitcairn Mutiny Island). Commemoratives and Pictorials! 3c with approvals. Star Stamps, Jamestown, New York.

PENNY approvals, including Pictorials. Frank Ebbrecht, 254 Second Avenue, West Haven 16, Connecticut.

25 DIFFERENT Stamps 10c. Tunis And Carpenter, Wakeman Ave., Newark 4, N. J.

BERLIN Bears. Complete set of eight and 100 different stamps only 10c to approval applicants. Reich Stamp Co., 4647 Kenmore, Chicago 40, Ill.

50 DIFFERENT United States 10c Price list free. Seidenberg, Cassopolis, Mich.

319 ALL different stamps from Vatican City, Palestine, Cyprus, San Marino, etc. with our sensational new illustrated 32 page Stamp Finder. It identifies all difficult stamps immediately. All for only 10c to approval applicants. A tremendous bargain. Garcelon Stamp Company, Box 818, Calais, Maine.

"GOYA NUDE" set complete 35c. Approvals. Royal Stamp Company, Tamaqua 2, Penna.

SPANISH Air Set free to approval applicants. Flamingo Stamp Company, Box 4038, Pinewood Station, Miami 38, Florida.

BET you haven't these! South Georgia, South Orkneys, Grahamland, South Shetlands, Shortlived Falkland Dependencies. Everything 3c with approvals. Viking, 130-P Clinton St., Brooklyn, N. Y.

110 DIFFERENT, Roosevelt, Hitlers, etc. 15c. Buckey, PS-208 Ludlow Bldg., Dayton 2, Ohio.

ROQUES Gallery Packet. Hitler-Mussolini, 30 others. 3c. Premium, Hartland 6, Me.

FOR Better U. S. approvals write today—Reasonable—Box 488 A, Minneapolis.

COLLECTORS only! Better Grade approvals reasonable. John's Stamp Service, Box 783, Holyoke, Mass.



**LIBERIAN** Triangulars. 10c with approvals. Vargo Stamps. 6044 South Fairfield. Chicago 29. Illinois.

**DIFFERENT**. 25 Canada. 25 Denmark. 25 Finland. 25 U. S. 3c with approvals. Alatalo, Maynard 1. Massachusetts.

**\$1.500 NEW** Chinese Commemoratives free with approvals. Gerhart, 2804 Rio Grande. Austin. Texas.

**50 DIFFERENT** China stamps and our price list. one silver dime. Stamp sales. Box 1649F. Oakland 4. California.

**WE** have some exceptional premium offers for collectors who send postal for our PSFP. Paramount Distributors. Box 884. Denver. Colo.

**25 DIFFERENT** Switzerland given anyone sending for approvals. Highland Star. Sierra Madre. Calif.

**31 DIFF.** Fiji. Johore. Honan. Free Jumbo lot 31 different includes above. also Monte Carlo. Kansu. Constantine. British & French Colonials. South Seas. Ship. Fish and Animal stamps. etc. etc. All free with approvals for 3c postage. Melvin Okin. 915 Bryant Ave. New York 59. N. Y.

**U. S. Approvals.** Used or mint. Good values. Panther Stamps. Dorchester 24. Mass.

**ARTISTS!** Austria's beautiful semipostal set. Ten Large beautiful stamps. Only 10c with approvals. Mack Dudak. Streater 7C. Illinois.

**GIVEN!** Fifty different worldwide with approvals. Jack Dudak. Streater 7C. Illinois.

**FREE—Beautiful.** multi-colored. unused Flag stamps! Catalog \$1.60. Sent by return mail—no waiting—absolutely free with approvals. George Wentz. San Marcos 18. Texas.

**SWITZERLAND** is calling stamp-collectors: We offer you sets from Switzerland. complete. historical edition 1524-1941. showing nine different pictures of popular Swiss soldiers. Value of this set is U.S.—\$1.00. Every collector receives one set for only U.S. \$.05. By the same mail we shall send you a little assortment on approval. containing very fine stamp material at cheap prices. Please give us exact address. age. profession and where employed. We frank with rare stamps. Atlas Stamp Ltd., Bahnhofstrasse 74. Zurich 59. Switzerland.

#### 42 HOBBIES, COLLECTIONS

**INVENTING** can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors. Dept. 30-E. 2926-Eye St., N. W., Washington 6, D. C.

**50 DIFFERENT** army embroidered patches \$1. Other bargains. Insignia Mart. 703B Broadway. New York 3. N. Y.

**UNUSED** Match Book Covers. 100 all different \$1.00. Free catalog. Charles Edelman. 1311 P East 84. Cleveland 3. Ohio.

**EXCHANGE** duplicates. Swappers everywhere. List free. Box 2166. Denver 1. Colorado.

#### 44 ANTIQUES, RELICS, INDIAN GOODS

**CLOSING** out:—435 antique Firearms:—35,000 coins. relics. cartridges. swords. flintlocks. carbines. antiques. Minerals. Illustrated Catalog 25c—Heike. Wenona 32. Illinois.

#### 46 MINERALS & PRECIOUS STONES

**GEMS.** precious and semi-precious. all genuine from world wide sources. Deal direct. no overhead. save money. Catalog 10c. Hill Co., Route 7-K. Salem. Oregon.

**BEAUTIFUL** Arizona Agates. Polished samples and listings \$2.00. Unpolished samples \$1.00. Arizona Agate Mines. Cave Creek. Arizona.

**GENEROUS** assortment slabbed gem material one dollar; carnelian agate grab bag. fifty cents. M & O Gem House. Mesilla Park. N. M.

**GEMSTONES.** rough. polished. Crystallized specimens. Every variety. lowest prices. List free. Plummer's. 5068 Brighton. San Diego 7. California.

**ZIRCONS.** Siamese mined. Mastercraftsman cut. ready to set. 2 firey samples \$1.00. 3 one carat dazzlers \$3.75. Others. Imhux PS. Box 232. White Plains. N. Y. Agents wanted.

**PETRIFIED** Wood. 12 Cubic Inches \$2.00. Flossie Lee. Mountain View 6. Okla.

#### 47 CAMERAS, PHOTO SUPPLIES

**BASS** says! At the sign of the old "Horse Trader." 38th year. Thousands of satisfied customers everywhere! Finest brands including Kodak. Bell & Howell. Argus. Zeiss. Leitz. etc. Satisfaction always guaranteed or your money back! Bass buys 'em. sells 'em. trades 'em. Write or wire. Bass Camera Company. Dept. AG. 179 W. Madison St., Chicago 2.

**MOEN'S** Sensational 50th Anniversary Supersize Prints! Our amazing new \$15,000 equipment will produce better. sharper supersize prints and faster. no longer need you wait. Send film today and see the difference. be the first to show your friends. 8 exposure rolls all supersize genuine Moentone Varigam prints only 35c; 12 exposure 55c; 16 exposure 65c. Moen Photo Service. 17 Moen Bldg., La-Crosse. Wisc.

**PHOTOGRAPHY** for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography. 1315 Michigan. Dept. 1742. Chicago 5.

**FREE** 2x2 Color Slide and Fine Grain Negative! Send self addressed stamped envelope for samples and catalog. James J. Bradford. 1302 Broadway. Burbank. Calif.

**BUY** cameras direct! Save difference. Directory 25c. "Cameras." 126 Lexington. New York 16.

**K-21 AAF** Aerial Combat Cameras. manufactured by Graflex; motor driven. with flexible shaft; 24 volt operation. including step-down transformer to 110 voltage; may be manually operated. Complete except for lens and filters. New; original government packaging; positively the lowest price in the country. for a limited time only. \$39.50. An Amazing value from Amazing Bachman's—Dept. PM. 27 Herman Street. Rochester 5. N. Y.

**INFRA-RED** Film makes for unusual pictures! Eastman Kodak. 35mm Infra-red. four 36 exposure reloaded cartridges. \$2.50 postpaid. Short-dated but guaranteed. Delta Photo Supply. 690-R Third Ave., New York 17. N. Y.

**KODABROMIDE** Enlarging Paper—4 1/4 x 8 1/2 feet rolls. Enough for almost 2,000 4 x 5 enlargements. Single weight. Actual test prove its worth. Fully guaranteed. Reduces printing costs to a fraction of a cent apiece. Value over \$35.00. Our price \$2.25 postpaid in U.S.A. Delta Photo Supply. 690-R Third Ave., New York 17. N. Y.

**PICTURES** never before possible! 35mm Tri-X Film. Weston speed 200 daylight. 160 Tungsten. Guaranteed. 36 exposure cartridges. 4 for \$2.50. Per dozen \$7.50 postpaid. Delta Photo Supply. 690-R Third Ave., New York 17. N. Y.

**8-16mm** MOVIE film developed ready for projecting—24 hour service. 100 ft. 16mm \$1.25; 50 ft. 16mm 85c; 25 ft. 8/8mm 60c. Radiant Cine Laboratories. Box 720A. Chicago 90.

**8-16mm** MOVIE Film in bulk for home processing. Big free catalog bargains in film. processing equipment. supplies. Superior. 105A S. Wells. Chicago 6.

**BREATH-TAKINGLY** beautiful color slides. Lists and sample 40c. Maine Photos. Box 1622A. Portland. Maine.

**LUMINOUS** rulers for photographic dark rooms. High luminosity. easily read. lasts indefinitely. 12"—\$1.00. 18"—\$1.50. Carbographic Studios. 800 N. Clark St., Chicago 10. Ill.

**BUY.** sell. trade fine cameras. lens. equipment. Kirby. 730 Edgemont. Dallas 16. Texas.

#### 48 PHOTO FINISHING

**THREE** prints each 8 exposure roll 40c. Two each 35c. One each 25c. Reprints 3c. Fred A. Eastman. Bode. Iowa.

**NEW** Process developing and printing. 8 exposure rolls 35c. Mayfair Photo Service. Box 261-A. Toledo. Ohio.

**FILM** Processing to Contact or Oversize Charges on Delivered Prints Only. Mail 35c and Film to Harold's. Sioux Falls. S. D.

**8 PRINTS** all enlarged to nearly postcard size from your roll or negative 25c; 16—50c. (Trial offer) Willard Studios. Box 3535G. Cleveland. Ohio.

**ENLARGEMENTS** 5x7 15c. 8x10 25c. Glossy or dull. Gorgeously oil colored 50c. Rolls developed and printed 25c. L & R. P. O. Box 1476. Milwaukee. Wisconsin.

**SAVE 50%** on your snapshots. Write for free price list. Roy Photo Service. G.P.O., Box 644. New York 1. N. Y.

**ROLL** developed. 8 prints and two enlargements 25c. Trial offer. Young Photo Service 406-C. Albany 2. N. Y.

**2 BEAUTIFUL** Hi-Gloss prints each good negative and enlarging coupon with each 6 or 8 exposure roll developed 28c. Owl-photo Co., Weatherford. Oklahoma.

**SENSATIONAL** Introductory Offer! Send snapshot or negative. this ad and 10c. We'll send you a beautiful 7 x 5" enlargement! Or. Kodak roll developed and printed (with free coupon) only 25c; or 8 Giant prints from roll. 30c. Reprints from negatives—any quantity—regular size. 3c; Giant size 4c. Candid rolls—36 exp. 35mm developed. vaporated. enlarged to 3 x 4. \$1.00. 18 exp. 50c. Free Mailers. Free Premium offers sent on request. American Studios. Dept. 365. LaCrosse. Wisconsin.

**SPECIAL** 10 reprints 25c. 100—\$2.00. Roll 25c. Dick's Photo. Louisville. Ky.

**ROLLS—8** exposure. Developed. oversized. placed in albums. Over-night service. Mail 35c in coins to Royal Palm Photo Service. 29 N.W. First Avenue. Ft. Lauderdale. Florida.

**8 BEAUTIFUL** Double Size pictures and roll developed 30c. 8 hour service. Free Mailers. Pacific Photo Service. Box 666. San Francisco. Calif.

#### 51 MOTION PICTURES. SOUND EQUIPMENT

**BEAUTIFUL** Kodachrome Slide and Lists 25c. Slide Supply Service. 3111 West Tuscarawas. Canton. Ohio.

**"BASS** says! 38 years of leadership means satisfaction to you! Finest equipment. 8 and 16mm. sound cameras. sound projectors. Bass buys 'em. sells 'em. trades 'em. Satisfaction always guaranteed or your money back! Bass Camera Company. Dept. A. 179 W. Madison St., Chicago 2.

**GUARANTEED** fresh anti-halo outdoor movie film! Weston 12! Daylight loading! Processing free! Three spools double 8mm. \$3.45! Six single 8mm for Univex. \$4.60! Postpaid! Catalog. Eso-S. 47th Holly. Kansas City 2. Missouri.

**KODAK** Super-X Movie Film at Give Away Prices! Gov't. Surplus but Good as Gold! Tested and fully guaranteed. 16mm 100' \$2.95; 50' Magazine \$2.50; 8 mm 25' Double 8 \$1.65. Processing included. Stock up for Summer Shootin'! Fotoshop. Room 186. 18 E. 42nd St., New York City 17.

**MOVIE** Film at Tremendous savings! Kodak Super X. Gov't. Stock. Tested. Guaranteed! 16mm 100 ft. \$2.95; 50 ft. Magazine. \$2.50; Double 8mm 25 ft. \$1.65. Super XX. 50c add'l. each roll. Free Processing. Fast Service. Photo Surplus Sales. Box K11. 12 Duane St., New York City.

**MOVIE** Film Processing—Finest Automatic Machine Processing. 8mm. 16mm. 48 hour service. Also duplicating. editing. titling. other lab. services. Send for list of prices. Fotoshop Inc., Room 163. 18 E. 42nd Street. New York City 17.

**ELECTRIC** Movie Cameras. 16mm. Army GSAP original condition. Value \$200. Complete with f/3.5 lens New \$32.50. Used \$19.50. Accessories available for home conversion. Free literature. Completely converted Lektro. 16mm. Ready-To-Operate \$59.50 Guaranteed. Magazine film for same. \$2.50. Includes processing. Fotoshop. Room 139. 18 E. 42nd St., New York City 17.

**8-16MM.** Silent-sound films. Complete rental library. All latest subjects. Free catalogues. (sample film 10c). Garden Film. 317 West 50th. New York 19.

**BENEFIT'S** Strip-O-Slides now available. Needed by every artist. 25 Art Studios in life-like color. on 35 MM Film Strip complete with 25 readymounts. only \$2.95 postpaid. (Add 10c for first class mail.) Series 1. 2. 3. 4 now available. Extra Special Viewer for \$1.50 when ordered with Strip-O-Slides. Benefit Corporation. 3807 F Benefit St., Baltimore 24. Md.

**ART** Film & Art Subjects; Get them all from Benefit. Be first with the best. Our special bulletins inform you of all new subjects immediately on release. Write now for free catalogue of over 100 8MM and 16MM subjects now in stock. Illustrated folder of fifty glamorous poses by Bruno now available. Send for your free copy today. Benefit Corp., 3807 F Benefit St., Baltimore 24. Md.



**BRAND** new 16MM sound projectors \$129.50. Send 10c for 1948 Photographic catalogue. Sterling's, 679 Northampton, Easton, Pa.

**SUPERB** Kodachrome home movies! "Atomic Fury", "Grand Canyon", "Yellowstone", "Yosemite", "Bryce", "Zion", "Petrified Forest." Dozens of others. Each, 8mm., 50 ft., \$6.50 (blackwhite \$1.75); 16 mm., 100 ft., \$13.00 (blackwhite \$3.50). Catalog 25c. No C.O.D.'s. World In Color, Elmira, N. Y.

**SOMETHING** new in 2 x 2. 100 new original art slides, full frame. Ansco color, never before offered: Mounted slides, 10 for \$4.50, 20 for \$8.50, 30 for \$12.50, 40 for \$15.50. No C.O.D.'s. All orders shipped postpaid. Benefit Corporation, 3807 F. Benefit St., Baltimore 24, Md.

**FREE!!!** Slide viewer with purchase of 10 "Artura Of Paris" Art Slides @ \$4.00. Guaranteed originals never seen before. Fifty, all different, \$18.00, with free file box. Shipped prepaid. Usher's, P. O. Box 1753, Dept. S, Philadelphia 5, Pa.

**PARTY** art films 8mm-16mm. Free Catalog. Wilco Photo Products, Dept. 59, 1186 Broadway, New York 1, N. Y.

**33MM SILENT** sound films supplies. Bedner, 5300 So. Talman, Chicago.

**SAVE \$30.00** yearly. Send stamp for details. Bonnie's Film Club, 422 Haven Avenue, Hamilton, Ohio.

**HOLLYWOOD** films. Color sample, \$1.00 (refunded). Catalogs 10c (refunded). Stone, Lunenburg 10, Mass.

**LEARN** movie projection, management. Free Catalog. Theatre School, Elmira, N. Y.

**ART** model films 16mm rentals exclusively, adults list. Enclose stamp. Revere Films, Box 1051, Detroit 31, Mich.

**FINEST** Movie Screens. Inexpensive. Make them Yourself. Free Literature. Snow White Screens, Danville 2, Illinois.

**PROCESS** own movie film. Free literature. Duro Products, 1519 N. Eggert, Buffalo 21, N. Y.

**IMMEDIATE** delivery of 16mm Sound projectors. Large stock of Castle, Official, Nu-Art and Pictorial films. Soundies Comedies, 16mm Ansco color film. Used 8mm, 16mm Sound. List Titlers, Splicers, Editors, Rewinders. (Home Movies, 41 South Fourth Street, Allentown, Penna.)

**FILM** Movetone is back. It's Weston 12 nonhalation. Free processing 100 ft. 16mm \$3.25, 25 ft. double 8mm \$1.50. Bulk film without processing 100 ft. 16mm \$2.25, double 8mm \$2.45. Free circular. Promader Genera, Davenport 5, Iowa.

**EXCLUSIVE** movies projectors, screens, free catalog. Home Pix, 1674 Broadway, New York 19.

**FREE** movie list. Superior Film Service, Box 713, Troy, N. Y.

**COMPARE** Prices 100' 16mm \$2.25, 25' 8mm \$1.25, 16mm magazine \$1.75. Titles 15c. Ambassador, 479-a-Quincy Street, Brooklyn 21, N. Y.

**BUCCANEER** new universal's 35mm camera with 1 3.5 coated lens. List \$65.00. Special \$54.00. Dan's Service, 411 Redgate Avenue-5, Norfolk 7, Va.

**THRILLING** 8mm, 16mm movies, catalog free. Fine Arts Productions, Box 2084-X, San Antonio 6, Texas.

**FREE** Movie catalog; sample films, 10c. Goodwill Company, Jackson, Tennessee.

## 52 MUSIC, MUSICAL INSTRUMENTS

**VIOLINS** Deep, Mellow, Soulful. On Credit. Easy terms for wonderful instruments. Get details today. Gustav E. Henning, 1106 N. 49th, Seattle, Wash.

**BE** Independent, tune pianos, music unnecessary. Practical Piano Tuning shows you how. \$2.00 Postpaid. Chord-Slide Co., Dept. PS, 3122 Lawrence Drive, Corpus Christi, Texas.

**MUSICAL** movements, \$2.00 Free photo. Pevar's, 4218 Viola, Philadelphia 4, Pa.

**HOHNER** Harmonicas. Marine band, and chromatics. Accordions, batons, everything, musical. Hawes Music Store, Portland, Maine.

## 53 SONG WRITERS

**POEMS** Wanted to be set to music. Free examination. Send poems. McNeil, Master of Music, 510-PS, S. Alexandria, Los Angeles, California.

**SONGWRITERS.** Songs Published Monthly. Advance Royalty. Send your songs or poems today for our exciting offer. Hollywood Tunsmiths, Dept. 10P-C, 1537 N. Vine, Hollywood 28, Calif.

**SONGWRITERS:** Send Poems for Free Examination and Outstanding offer. United Music, 116, Salem, Indiana.

**\$1,200.00 PAID** Yearly to new songwriters. Opportunity for publication and advance royalty. No charge for melodies. Records, lead sheets furnished. Send song material now for free examination. Get details. Cinema Song Company, Dept. B-59 Beverly Hills, California.

**POEMS** Wanted For Musical Setting. Send poem for free examination. Five Star Music Masters, 646 Beacon Bldg., Boston.

**SONGWRITERS**—Protect your songs. Get the facts first. Free booklet, attractive offer. Song Service, 331-J West 46th, N. Y.

**POEMS.** Melodies, unpublished songs wanted. Immediate publication, recording contracts! National, 19-P South La Salle, Chicago.

**POEMS** wanted for musical setting. Send Poem for immediate consideration. Hamann Service, 626 Manhattan Bldg., Milwaukee, Wisc.

**HONEST** outstanding music writing offer. Len-Tex Studios, Leonard 3, Texas.

**SONG-Poems,** titles wanted. Outstanding proposition. Special Service (P), 2115 Kenilworth Ave., Berwyn, Ill.

**RADIO** wants poems for musical setting. Radio Composers, WDH, Clinton, N. C.

**SONG** Poems set to music, Arranged & Recorded. Send poem for immediate consideration. Clover Recording Service, 441 No. Camden Drive, Beverly Hills, Calif.

## 54 RADIOS, SUPPLIES & EQUIPMENT

**MAKE** Simple, Tubeless, Batteryless. Distance-Getting Crystal Radios. Crystal and illustrated instructions 25c postpaid. Allen, 427-S, Clinton, Mo.

**U.S. Signal Corps** Featherweight Earphones \$1.00. Radio Service men and experimenters send stamp for our giant radio catalogue. Save dollars. United Radio Co., (100-V) Newark 1, N. J.

**FIX** any radio. Amazing new instrument locates radio troubles double quick. Simple instructions show you how. Thousands in use. Write today for 24 page booklet "The Inside Story." Feller Engineering Co., 945 George St., Dept. PS, Chicago 5, Illinois.

**BUILD** "Loudest" crystal radio. Instructions, loud crystal: 25c. Amorose's, Rt. #4, Richmond, Va.

**CRYSTAL** Radio works loudspeaker. Illustrated instructions 25c. Hulet, Lakewood, N. J.

**MAKE** selective distance getting crystal radios. Tube radios. New designs. Instructions, crystal, catalog, 25c. Radio Leader, LaVerne 6, Calif.

**26 YEARS** Experience radio repairing at your fingertips. I've repaired 45,000 radios. Have perfected simple system you can follow step by step. No calculations or formulas. Total price \$2.00 postpaid or COD. Moneyback guarantee. Ross Radio, 14615-N Grandriver, Detroit 27, Michigan.

**24 PAGE** plans "18 Crystal sets" (SW record 5800 miles), including "Radio-builder"—25c. Laboratories, Eye-t, San Carlos, California.

**COMPLETE** crystal radio kit, aerial and headphone, only \$2.95 with order. Al's Radio Service, Sioux City, Iowa.

**SURPLUS** amplifier A.M. 26 \$2.95. Radio tubes 90 day guarantee. 12 A6-24A-80-\$4.99. 6H6-6SH7-6V6-12J5-25Z5-27-\$5.54. 6C5-6D6-8K7-6SA7-12SK7-\$5.59. 6A8-6F6-6Q7-6SN7-7C5-7F7-7Y4-\$6.99. Kay Electronic Co., Box 25, Hollis, N. Y.

## 56 BUSINESS OPPORTUNITIES

**\$25 WEEKLY** working two hours daily. No canvassing. No Manufacturing. Lycke, Box 2471, Cleveland 12, Ohio.

**OPERATE** profitable home business selling merchandise by mail. Fast sellers. Large profits. Powell Service, 5713 Euclid, Cleveland 3, Ohio.

**RECAST** old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

**SPECIALTY** Manufacturing, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting Free booklet, "Money-making Opportunities in Specialty Manufacturing." Howard Robinson, Ph. G., 1300-B S. Ohio St., Sedalia, Mo.

**137 PLANS** to make money local, mail order. Particulars free. Elite Co., 220-A Grand St., N. Y.

**GOOD** Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late methods. No tanks or shop required, outfit furnished. Free Booklet. Gunmetal Co., Ave. E, Decatur, Illinois.

**START** home business making statuettes, plaques, artificial marble flooring, liquid marble, rubber molds, metallizing baby shoes. Amazing profits. Folder Free. Creative, 236-M, Winnetka, Illinois.

**TRAVEL** anywhere anytime. Earn \$85.00 week up. Be your own boss. No experience necessary. Less than \$5.00 investment required. Literature free. Traveler, La Grange 2, Indiana.

**BIG** profits and your own business casting new 1948 Metal Toys and Novelties. Latest scale model Autos, Original Ashtrays, Savings Banks, Water Pistols, etc. Enormous wholesale and chain store demand keeps manufacturers busy. No experience or special place necessary. Write for details and illustrations of patterns needed. Metal Cast Products Co., Dept. E, 1696 Boston Road, New York 60, N.Y.

**OPERATE** profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

**NO** selling, operate vendors, amazing profits, details Free. Factory Silver-King Corp., 622 Diversey, Chicago, Ill.

**MEN** with ambition apply only. Make money in Mail Order. Small Capital. Not a Get rich quick plan. Inquire. Bacon Enterprises, D 27, Ware, Mass.

**MAKE** and sell candy professionally, inexpensive to start, information free. Philip Pate, Kissimmee, Florida.

**SELL** Greeting Cards, Pictures, Signs, Novelties, Books! Large Profits! Catalog Free! Ellico, 434 North Wells Street, Chicago 10.

**MANUFACTURE** Yourself: Cleaners, Polishes, Cosmetics, Formula Catalog free. Kemico, 10, Parkridge, Ill.

**ELECTROPLATING** booklet tells how to start your own business or work for others at big pay. Learn at home in spare time. Send postcard for free copy today. Hyde School of Electroplating, Room 523, 432 F Street, San Diego 1, California.

**VENDING** Machines earn big money! An investment as low as \$10.50 will start you in this fascinating, profitable business that can lead you to the road of success and independence. Routes can be established and operated in either full or spare time with no experience needed. Write for full details and our free catalog illustrating our nut, candy, gum and stamp vendors; also slot machines, amusement games, etc. Parkway Machine Corporation, 623 W. North Avenue, Dept. 9, Baltimore 17, Maryland.

**OWN** Your own Dry Cleaning Business For as Low as \$3200.00. For Information, Write Triplex Industries, Inc., 3601 South Racine Avenue, Chicago 9, Illinois.

**ENVELOPES** addressed accurately, reasonably. Fast Service. We have capable addressers in your city. Glenway System, 5713-Z Euclid, Cleveland 3, Ohio.

**WHOLESALE** vitamins, minerals, concentrates, health books. National Products, Portland 2, Oregon.

**AMAZING** values, remnants rayon housewife buy on sight. Write B & M Textiles, 78 No. Main St., Paterson, N. J.

**COLORGLAZED** Concrete Pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, Minnesota.

**START** Electrifying Sewing Machines: Free Details. Pasaak's, Box 153-S Canal Station, New York 13.

**LEARN** Piano Tuning, Repairing, at home. Tremendous field! Piano parts, tools furnished. Established 1935. Empire School of Piano Tuning, 606-A East University Ave., Champaign, Ill.



OWN mirror shop. Resilver mirrors. Glass sign making. Electroplating. Supply prices. John Sprinkle, V90, Marion, Ind.

TRADE Magazines will help you get ahead. Latest copies on every trade, business or interest for only a few cents each. Write for Free price list. Commercial Engraving Publishing Co., 34S North Ritter, Indianapolis 19, Ind.

IF you work in a factory or shop, you are passing up the opportunity of a lifetime to build a steady Extra Income by selling subscriptions to Popular Science Monthly to your fellow employees. For free kit and complete instructions write on a postcard to—Manager of Agents, Dept. A148, Popular Science Publishing Co., Inc., 353 4th Ave., New York 10, N. Y.

LIQUID Rubber for making flexible molds. Cast novelties. Sample bottle 25c, free literature. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

EARN faster promotions on your job. Exciting new book shows how. Details free. Castle Book Company, 36 Glenwood Road, Baltimore 21, Maryland.

ELECTROPLATING kit, \$5.00 complete. Guaranteed free details. Star Products Company, Broomall, Penna.

OWN your own wholesale distributing and service business. Thick market, repeat orders year around. Employ others. Protected territory. Write Hinson & Company, Richmond, Indiana.

SELL office supplies by mail. Repeat business makes good profits. Details free. Glenn Snyder, 5-P Spring, Beachwood, New Jersey.

FOR an extremely profitable lifetime business operate a Collection Agency-Credit Bureau. Easily learned. Free folder. Cole & Associates, Syracuse 2, N. Y.

MAKE money sharpening saws at home on electric machine. No experience necessary. Hardware dealers act as your agents to secure work. Send for Free Book "Independence After 40" shows complete plan for starting in spare time. Foley Mfg. Co., 48 Foley Bldg., Minneapolis 18, Minn.

"PLIASTONE"—New building material. Resurfaces old homes, build new ones. Composition floors; colored tile. Particulars free. Marbleized Service, Edwardsville, Illinois.

NATURAL molding latex. Extra thick. Free Sample. W. Wooley, 115-B Donald, Peoria, Illinois.

POPCORN Machines. Potato Chip outfits. Long Eakins Co., 4863 Hi St., Springfield, Ohio.

EXTRA Money? Free Details. Trable, 1018½ B Elm St., Dallas, Texas.

SELL Luxury perfumes for profits and repeats. Generous samples \$1.00, deductible first order. Edward Lawson, 9-21 Joiner St., St. Augustine, Florida.

FLEXIBLE Molds to order, also originals. Professional course manufacturing molds and cast novelties. Latex, lacquers, flocks, flocking equipment, supplies. Plastics, Box 1574, Boston 4, Mass.

PROFITS From Plastics—A postcard will bring you free details. Plastics Research, Box 346, Alhambra, Calif.

RUBACREAM! Natural Rubber Latex! Makes molds quicker! Thicker! Free Sample convinces! Castcraft Studios, 509-S Fifth Avenue, New York 17.

AGENT or exclusive distributor for cigarette lighter Mfg. MacGregor, Tahoe Valley 15, Calif.

WOULD you invest \$10.00 for guaranteed monthly income? We take all risk! Write for free amazing offer. Auditax Systems, 4513-L Sunset, Los Angeles 27.

A FACTORY in your home garage! Mfg. and sales rights, mechanics' waterless hand cleaner, \$500-\$800 monthly. No special equipment necessary. Western Aircraft Mfg., Dept. G, Los Angeles 6, Calif.

PRESERVE baby shoes instructions \$1.00. Johnson, 2511Ps2 Harriet, Minneapolis 8, Minn.

MAKE Rubber stamps, metalize baby shoes, silver mirrors. Make plaster Novelties. Catalogue of "20 Ideas" Free. Universal, Box 1076-B, Peoria, Ill.

YOU make them, we sell them! New liquid plastic makes many items. Terrific Demand! Earn minimum of \$50.00 per week at home. No experience or machinery required. We supply raw materials and instruction. Write Travaco Laboratories, P. O. Box 1883, Boston 5, Mass.

MAKE flexible molds! Few cents each! Cast plaques, novelties, bookends! Free sample! H. Tooker, Hamilton 7, Ohio.

\$50.00 WEEKLY income from Home Mimeograph Shop. Folio tells how, only \$1.00. Mimeograph Service, Box 496, Russellville, Arkansas.

NEW proven business, cleared originator \$400. Third month. Letter instructions \$300. Germain's, 1450 19th, Columbus 11, Ohio.

INCOME from local information. No selling. Neher Company, LaVerne 6, Calif.

RUBBER: White liquid rubber! America's finest flexible molding rubber! New! Extra heavy viscosity! Quick drying! Ideal for home, classroom, or industry. Only \$7.95 per gallon, \$2.95 per quart, and \$1.00 per half-pint sample. Parcel post prepaid! Plastercraft Supply Company, 3051 St. Clair Ave., Cleveland 14, Ohio.

START Business! "With \$1.00"! Money-maker! Free Sample! Stephen's, Grand Junction, Colorado.

BABY Shoes preserved. Formulas. Instructions \$1.00. Supplies & Bases. Novelty Bronzing, Box 56, Hyde Park 35, Mass.

MOLD Makers. Genuine natural latex for rubber molds, only two coats needed for thick mold. Reproduce statuary, plaques. Inexpensive. Write Major Chemical Co., 131A Inman Street, Cambridge 39, Mass.

"GOLDEN Opportunity." How to Establish and Operate a Successful Mail Order Business. Free information. Palmer Publications, 4219-D Southwest Marigold, Portland 1, Oregon.

MONEY for you in your own business. Many surprising opportunities. Free information. Empire, Box 1340-B, St. Louis, Mo.

BIG Money In Vending Machines—Smallest capital start brings immediate profits that build permanent profitable business. Starting instructions free. Becker Vendors, 105-P Dewey, Brillion, Wisc.

GET 400 money making ideas. Formulas. Plans. Schemes. Folio free. Formico Prod., Box 572, Dayton, Ohio.

QUICK Money! "Repairing Car Batteries." At home! Easy too! Write, Batteryman, Grand Junction 1, Colorado.

\$46 FROM Square Foot Plywood; Jigsaw necessary. Write; Woodart, Bridgewater, Massachusetts.

MAIL order "profitunities." Free information. Cox, 14 Church, Saugus 9, Mass.

200 PLANS that guarantee your future success. Particulars free. Business Consultants Inc., Dept. 122, Clinton, Illinois.

BRONZED Baby shoe mountings and supplies. All metal bronze bookends, picture frames, ashtrays, etc. Onyx ashtrays, desk sets, plaques, etc. Hardening solution. 30-amp plating rectifiers with powerstat control. \$85.00. Geared motors for agitation \$20.00. Lead lined tanks. Write for list. Hollywood Bronze Supply, Dept. S, 1770 N. Vermont, Hollywood 27, Calif.

METALIZE baby shoes. Excellent profits. New system assures success. Free details. Treasures Forever, 89 Henry Ave., Lynn, Mass.

METALIZING Baby shoes, easily learned. Free details. Houghton, 8 Mt. Vernon, Charlestown 29, Mass.

WOULD you pay 3%—first \$350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Some offer occasional "day off." Work home. Expect something odd! Pacific, Oceanside, Calif.

GET Hundreds Money Making Deals. business ideas, plans and manufacturing. Amazing folio free. Austin Mail Service, 5538 Lexington, Chicago, Ill.

SELL!! Balloons, Combs, Specialty Merchandise. Carleton House, Distributors, Texas City, Texas.

"OPPORTUNITIES for you in modern Electroplating." Free, illustrated booklet. Write Joseph B. Kushner, Metal Finishing Consultant, Stroudsburg 9, Pennsylvania.

CO-PUBLISH fiction magazine. Detailed prospectus copy 15c. Fezler, Patchogue, New York.

OWN-operate Cigarette Vending Machines in hotels, taverns, garages, etc. 6-column machines, price, \$59.50 each. 9-column machines, price \$90.00 each. Peanut and Ball Gum Machines, \$13.95 each. Immediate delivery. Write for free circulars. Cameo Vending, 432 West 42nd St., New York.

AMAZING holding screw drivers! Insert, remove screws inaccessible places! Exclusive distributor; factories, garages, mechanics, stores buy quantities. Millenco, 272 Miller Bldg., Boston, Mass.

LEARN profitable Rug cleaning business. Corssen, 2638 Geyer, St. Louis 4, Missouri.

EARN \$5-\$15 in 15 minutes Electrifying Sewing Machines and converting into Portables and Consoles. Top Prices Paid For Old Machines. Free details. Universal Sewing Supply, 771 Miller Ave., Brooklyn 7, N. Y.

BE your own boss. Metallize baby shoes. At home spare time. Schwieger, 8404-A West Chestnut, Wauwatosa 13, Wis.

MAIL order business your opportunity. "How To Build Your Own Mail Order Business." Beginner's idea-book tells how. Quarter, postpaid. Satisfaction warranted. Gilchrist, 622-S, Mass. Ave., N.E., Washington 2, D. C.

MAKE money making new greaseless doughnuts at home on electric machine. Wholesale to grocers, drug stores, cafes, hamburger shops. Send for free recipes and plans. S. Ray Company, 3605 South 15 Ave., Minneapolis 7, Minnesota.

GET this guaranteed formula for stopping toothache, excellent profits. Send \$1.00 today. R. M. Herriott, Box 953, San Antonio, Texas.

EXTRA dollars or a good living with your typewriter. New, exclusive opportunity. Never before offered. Get details now. Schroder, 221 Bush, Covington 2, Ky.

SPIN Angora wool. Ideal home business. Sell yarn retail or wholesale. Write for descriptive circular. House of Angora, Springfield, Illinois.

COLORADO and Wyoming's fabulous oil boom spawning new millionaires. You too want shot at \$1,000—\$5,000—\$20,000 on investment of only \$140? New high price of \$2.65 per barrel for oil setting people crazy. Write me today—not tomorrow for details. I'll attend to everything while you stay home. Dyer-PS, 1835 Champa Street, Denver, Colorado.

ELECTROPLATE on leather, plastics or metal. Instructions \$1.50. Four ampere plating unit with instructions \$19.95. Eight ampere unit \$29.95. Kissel Electric Products, 431 Sherman, Galion, Ohio.

MAILING postcards selling repeat merchandise is profitable. Everything supplied. Details free. Gordon Publishers, Box 23, Pawtucket, R. I.

LIQUID Marble—make in any color. Soundproof plastic flooring. Flexible molds. Cast novelties, plaques, statuary. Big Money—your own business. Catalog free. Write—Bing Products, 88-B7A Broad Street, Boston 10, Mass.

WHILE you wait photo cameras. Easy operation. Millman, 1094 Flatbush Ave., Brooklyn, N. Y.

WATCHES, wholesale; Rebuilt Elgins, Walthams, Bulovas, etc., new and used Railroad. Stop, diamond, rhinestone, \$9.50 up. Catalogue free. Brookings, B-TG1975, Little Rock, Ark.

UP TO \$1500 yearly selling by mail in spare time interest you? New plans every month. Details free. Biome, Box 588-S, Stillwater, Okla.

TURN Waste into durable plastic! Make attractive walls, roofs, floors. Laboratory, 327 S.E. 46th, Oklahoma City 9.

START Own business making new designs of interlocking concrete building block. Rex Products Co., Dept. 21, Piqua, Ohio.

DISTRIBUTORS, all territories, new Simplified Bookkeeping System, includes preparation income and estimated tax returns. Opportunity of a lifetime. Large permanent profits. State qualifications for complete details. NAS, Dept. PS-1, 5225 Hollywood Blvd., Los Angeles 27, Calif.

BIG Money. Full or spare time right in your own home. New Miracle Finishes—Professional plush and suede finishes sprayed on signs, radios, figurines, lamps, toys and other items. New Flok-Kraft methods—material costs few pennies—You get Dollars. Free sample, details of powerful money-making plan and hundreds of useful ideas. Coast, 1511 West Manchester, Los Angeles 44.

INSTRUCTIONS on "Permanizing" baby's shoes. Lucrative business. Material to "Permanize" pair included. \$5.00. "Permanizer," Box 484, Cadillac 1, Mich.



**MAKE \$5.00 per hour full or spare time** right at home Preserving baby shoes in real bronze, gold, silver and pearl. Full details free. Kiktavi Co., 2111-B W. Manchester, Los Angeles 44, Calif.

**12,000,000 COLLECTORS** your market! Become successful stamp dealer. Big profits! Proven method. Details free! Largentiere Company, 6462 83rd Place, Forest Hills, New York.

## 57 MONEY MAKING OPPORTUNITIES

**21 POPCORN, Candy Apple, etc. Formulas.** All money-makers, \$1.00. We can supply equipment. Concessions Supply Co., Dept. "B", Box 133 Sta. "B", Toledo, Ohio.

**DETECTIVES Earn Big Money.** Experience unnecessary. Particulars free. Waggoner, P-125, West 86th, N. Y., N. Y.

**LATEST money making homework plans.** Write Kearns, 15221-A Kinsman, Cleveland 20, Ohio.

**LATEST Money-making opportunities.** Variety of choice. Details free. Edward Stevens, 716 W. 4th St., Michigan City, Indiana.

**IF you work in a factory or shop, you are passing up the opportunity of a lifetime to build a steady Extra Income** by selling subscriptions to Popular Science Monthly to your fellow employees. For free kit and complete instructions write on a postcard to—Manager of Agents, Dept. A148, Popular Science Publishing Co., Inc., 353 4th Ave., New York 10, N. Y.

**WIN contest money.** General Contest Magazine gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609-A East 5th, Duluth, Minn.

**PRIZE Contest Fans Reap Rich Rewards.** Enclose 3c stamp. National Contest Bulletin, Box 2685-S, Miami 31, Fla.

**MANUFACTURE costume jewelry** at home for profit, hobby, therapy. Free wholesale supply catalogue. Instructions. Florida Supply House, Bradenton, Florida.

**MAKE \$3 to \$10 per hour in spare time** with Emrick Workshop, doing home repair jobs for others. Five power tools in one unit (Lathe, Drill Press, Circular Saw, Grinder and Sander). Uses 1/4 H.P. motor. No toy or gadget, does heavy work. 83 operations. Buy at factory price, save 50% complete, only \$34.95. Write for free literature. Emrick Inc., 1730 Clinton, Kalamazoo, Michigan.

**EARN Money Evenings,** copying and duplicating comic cartoons for advertisers. Adservice, Argyle (2), Wisconsin.

**WOULD You pay 3%—first \$350 made?** Color-illustrated book "505 Odd, Successful Enterprises" free. Expect something odd! Pacific, Oceanside, California.

**EARN several thousand yearly** handling advertising pens. Permanent. Arrow Press, (Dept. S), Box 933, Buffalo, N. Y.

**LEARN to make seashell jewelry,** pens, earrings, hair ornaments, novelties. Instructions and design book free with \$2.00 and \$5.00 kits, postpaid. Herbert Diamond Co., Box 4619, Miami 31, Fla.

**BIG Money item,** 250,000 satisfied users. Sample 25c. Globe, 37-46 94th Street, Jackson Heights, N. Y.

**MAKING money mailing circulars.** Booklet 25c. Artistic, 217-S Longwood, Merchantville, N. J.

**A \$100 a month hobby at home!** No soliciting, no mail order, no meeting people. Easy, enjoyable pastime. Details, 25c (Refundable.) Laura Dickson, 1006-PS Elizabeth St., Anderson, S. C.

**GET 400 money plans,** Formulas, Tips, schemes, ideas. Folio free. Formico Crafts, Box 572, Dayton, Ohio.

**WIN Contest money,** send 25c guaranteed instructions for writing winning answers. Winacontest, 22 Westlake Ave., Auburn, New York.

**START your own business!** Big money manufacturing novelties, plaques, statuary. Free catalog. Write Bing Products, 68-B7B Broad Street, Boston 10, Mass.

**OPERATE home mail order business.** Details Write, McKenzie, 6320 Southern, Detroit 10, Mich.

**SAWDUST.** Turn it into cash. Six methods. Instructions 25c. Charles Co., 12-ER, Norwood, Ohio.

## 58 FORMULAS, PLANS, ETC.

**10,000 FORMULAS and Trade Secrets.** Free Literature. Stillmans, 555 Kingston Ave., Brooklyn 3, N. Y.

**FORMULAS for twenty-five useful products.** One Dollar. Chemist, Box 274, West De Pere, Wisconsin.

**REJUVENATE favorite Phono-Discs;** simple chemical restoration process (adaptable commercially) \$1.00. Box 654, Berkeley, California.

**OPPORTUNITIES!** Catalog describing 200 Helpful Formula. Money-Making Books. Air-mailed throughout world for stamps. Adams-Brown, Boston 67, Mass.

**400 MONEY Making Deals.** Formulas. Mfg. secrets. Tips. Folio Free. Formico-NA, Box 572, Dayton, Ohio.

**FREE formula catalog** anything analyzed \$20.00. Western Chemical, Salem, Oregon.

**TESTED formulas.** Interesting descriptive booklet free. Pont, Box 635-PS, Terre Haute, Indiana.

**MOST everybody likes candy.** Learn to make professionally. (Our 38th year.) Ragsdale Candies, D14, East Orange, New Jersey.

**MAGIC Glass** see through one side and not the other! Formula one dollar. Arnold, 7301 N. Figueroa St., Los Angeles, Calif.

## 59 PLASTICS

**LUCITE, Plexiglass.** All size sheets. Cost square foot (12" x 12") 1/16" 90c; 1/8" \$1.16; 3/16" \$1.43; 1/4" \$1.68; 5/16" \$2.09. Include 10% postage. Almac Plastics, 230 Fifth Ave., N. Y. 1, N. Y.

**PLASTICS—Sheets, rods, tubes; dyes.** Plastic coatings. Shells, findings, craft supplies. Lucite scrap 25c pound up. Illustrated fabricating manual, price list, 10c. Lucite sample, 35c. Courtesy to dealers. Gem-O-Lite, 5350G Riverton, North Hollywood, California.

**SUMMER Special.** 1 each 6" x 12" Masked Plexiglas Sheet, 1/16", 1/8", 3/16", 1/4" \$3.00 Postpaid. Free Listings. Craft Plastics, Somerville 1, New Jersey.

**PLASTIC—Sheets, Rods, Tubes, etc.** Free List. Plastic Supply Co., 2618 St. Louis Avenue, St. Louis 6, Mo.

**REAL Flowers Embedded in Clear Plastics.** Pins, \$1.50 each. Earrings Pair \$1.00. Astoria Products, 631 3rd Ave., N.Y.C.

**INTERNAL Carved swans, bluebirds, goldfish, butterflies, etc., plus, \$1.50.** Rose or Daisy costume jewelry sets, \$1.50 less findings. Also gifts and novelties. Crystal Floral Novelty Co., Somerville, New Jersey.

**BOOK—Illustrated, Fabricating, forming Lucite.** Simplified methods, projects. \$1.00 P.P. Ideas-D, 11379 Ventura, North Hollywood, Calif.

**LUCITE, plexiglas, bakelite, acetate;** sheets, rods, tubes; clear, colored. Internal carving blocks, dyes, cements. Free price list. Martin Plastics Co., 68 Arcade Bldg., Providence, R. I.

**INTERNAL carving drill.** Lucite blocks, \$1.50 bulletins, 5c. Technicraft, 1156 Commonwealth, Boston 34, Mass.

## 60 CHEMICALS AND APPARATUS

**LEARN Chemistry at home,** from the House of Winn, Home of Supplies for student Chemists. New idea chemical and apparatus outfits for Home Experimenting. Photographic Scales. Semi-Professional Microscopes and accessories. Send 15c for retail catalogue. Established 1931. John H. Winn, 124B West 23rd Street, New York 11, N. Y.

**INTERESTING Catalogue Rare Elements.** Chemicals small quantities, processes. Dime refunded first order. Vicar Laboratories, Established 1916. Guerneville, California.

**FREE catalog: Chemistry, Mineralogy, Biology, Physics, Tracey Laboratories,** Evanston, Illinois.

**CHEMICALS—Lab supplies,** catalog 5c. H. J. Hagenow-Lab, 1606 Grand Ave., Manitowoc, Wisconsin.

**HANDBOOK for Chemical Experimenters.** Hundreds of Experiments; Illustrated, 50c. Experiment Booklet, 15c. Supply Catalog, 5c. Reading Scientific Co., Reading, Penna.

**CHEMICALS, ounce quantities,** apparatus catalog 10c. Fleischer's Laboratories, Everett 49, Mass.

**NEW Laboratory supply catalog of chemicals and apparatus.** Contains many thousands of items with illustrations. Send 25c. Standard Science Supply Company, 1232 N. Paulina St., Chicago 22, Illinois.

**CHEMICALS and apparatus for industrial, analytical, and private laboratories.** Catalog 10c. Dept. M-26. Biological Supply Co., 1176 Mt. Hope Ave., Rochester 7, N. Y.

**EDISON'S home laboratory** made him famous. Start yours today. Catalogue chemicals and apparatus 15c. Microscopic stain catalogue 20c. Both for 25c. National Scientific Company, 2204 North Ave., Chicago 47, Ill.

**COMPLETE supply catalog,** 10c. Pilgrim Chemical, 348-DD Edith, Salt Lake City 4, Utah.

## 61 HELP WANTED

**"ALASKA—The Last Frontier"** offers unlimited opportunities. \$1.00 brings official government map & copyrighted report with Fish & Game rules, listing fishing, construction, mining, aviation companies, homestead and Alaskan Highway information. Alaska Opportunist, Dept. PS, P. O. Box 883, Hollywood 28, Calif.

**INTERESTED in Latin American & Foreign employment???** \$1.00 brings 1948 Copyrighted Foreign Service Directory listing firms interested in oil, construction, mining, aviation, exports & imports. How-when-where to apply. Hot list of companies hiring. Global Reports, Dept. PS, P. O. Box 883, Hollywood 28, Calif.

**IF you work in a factory or shop, you are passing up the opportunity of a lifetime to build a steady Extra Income** by selling subscriptions to Popular Science Monthly to your fellow employees. For free kit and complete instructions write on a postcard to—Manager of Agents, Dept. A148, Popular Science Publishing Co., Inc., 353 4th Ave., New York 10, N. Y.

**EARN up to \$520 month part or full time** keeping books for small firms. Simplified System. Write Tax-Saver System, Dept. W, Fort Worth, Texas.

**FOREIGN Employment?** July directory, application forms and bulletin 39-B. \$1.00 or C.O.D. Foreign Service Institute, Box 3934-A, Miami 24, Fla.

## 62 AGENTS WANTED

**GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method.** No tanks or shop required, outfit furnished. Free Booklet. Gunmetal Co., Ave. G, Decatur, Illinois.

**EXCELLENT Sideline for printing and advertising salesmen.** Decalcomania name plates in small quantities. Great demand. Also, make money with our line of Automobile Initials and Sign Letters. Free Samples. "Ralco", XL-Roxbury, Boston 19, Mass.

**AGENTS—300% profit** selling genuine gold window letters; stores and offices. Free samples. Metallic Letter Co., 437 N. Clark, Chicago.

**JOBS Open In Selling!** Send name, address for Free copy Opportunity Magazine, listing hundreds of companies who need men now, full or spare time. Experience not essential. Opportunity, 28 E. Jackson, Dept. 15, Chicago 4, Ill.

**RESTAURANT Salesmen—New fast selling** sideline that nets 200%. Sample free. Theron Fox, 1296A Yosemite Ave., San Jose 11, Calif.

**BIG Money Quickly and Easily** taking orders for complete line Personalized Initialed Buckles, Belts, Cap Badges, 2,000 Emblems. Fast repeats. Write today. Hookfast Company, Box 480-PS, Roanoke, Virginia.

**MAKE more money** selling personal initialed individualized belts, buckles, cap badges, tie holders, name plates, 2,000 emblems to choose. Big profits, whole or part time. Write today—special outfit order. Hookfast Specialties, Box 1425, Dept. 7, Providence, Rhode Island.

**SELL new, used clothing** from home, auto, store. Wholesale catalog Free. Calumet Sales, 4719 Kennedy Ave., East Chicago, Indiana.

**SALESMAN: \$20 to \$30 a day easy.** Sensational new Raised Letter Metal Nameplate, beautifully framed in Mahogany. Amazing seller to homes, stores, offices, etc. No deliveries. Get our tested plan. Write Raised Letter Metal Co., Dept. 2278, Fox Bldg., Philadelphia 3, Pa.



**AGENTS** for Educational Institution NYC area; liberal commission; no investment. Box 686, Journal Square Station, Jersey City 6, N. J.

**ADVERTISING** book matches—Cash in on Political campaigns—sell Union Label matches. Cuts for all businesses and political parties—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash commissions. Superior Match Co., Dept. P-78, 7530 Greenwood, Chicago.

**FREE** water and our concentrates make flavors, lotions, shampoos. 72 products. Labels, bottles furnished. Qualco, P-20030 Russell, Detroit.

**EARN** Big Money Year 'round. Be a one-person-department-store. Take orders for shirts, ties, hosiery, lingerie. Household linens, etc. For information Corporate Merchandisers, Dept. PS-4, 110 West 34th Street, N.Y.C. 1.

**SPORT.** Dress Shirts, Cotton House-dresses. Tremendous Bonuses. Free Kit. Jarod Manufacturing Corporation, Rockville Centre 1, New York.

**A DRESS** yours with every 3 you order for yourself and family. Amazing new bonus plan. Everything Free. Harford Frocks, Dept. P-9129, Cincinnati, Ohio.

**SELL** Gold embossed monogram stationery. Sample free. Dunbars, Sanford, Fla.

**\$1 STARTS** you in business. Sell lined ties. 100% wool interlining. Costs you only \$7 per dozen, you make \$5.00 dozen. Send \$1.00 for special introductory offer two ties. Catalog complete line Free. Philip's Neckwear, 20 West 22nd St., Dept. P-24, New York 10.

**ACT.** Sell New Xmas Photo Greeting Folders. Big profits, we deliver, free kit. Spooner, 115 Chauncy, Boston, Mass.

**CALL** on friends with sensational Christmas Cards in handy assortments. Sell for \$1.00. Profit up to 50c. Also popular-priced Personal Christmas Cards. Everyday assortments. Stationery. Imported Napkins. Samples on approval. Wallace Brown, Dept. G-4, New York 10, N. Y.

**MAKE** more money in spare time handling magazine orders. Fall best selling season. Our helps build big repeat business. Wholesale catalog Free. Write McGregor Magazine Agency, Dept. 13, Mount Morris, Ill.

**GOLD** lacquered Window Sign Letters. Large Sizes Penny Each. New Foils. Absolutely Beautiful. Free Samples. Atlas, 544 W. 79th, Chicago 20.

**AGENTS** Wanted for our Slot Machines and coin operated amusement games in every town and community. Sell to clubs and homes, or start a route. Webb Distributing Co., Dept. P40, 6 So. Kedzie Ave., Chicago 12, Ill.

**SHINE** Shoes Without "Polish". New invention. Lightning Seller. Shoes gleam like mirror. Samples sent on trial. Kristee 124, Akron, Ohio.

**POCKET** Pal: Replaces pocket knives. New, safe, beautiful. Always razor sharp. 50c seller. 231% profit. \$15.00 or more daily. Agents, Salesmen, Distributors. Sample 10c. Nelson Mfg. Co., 222 W. Kellogg, St. Paul 2, Minn.

**LOOK** here! Wanted—Men to start in business on our capital. Sell some 200 farm-home Products. Thousands our Dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. G-192-PSC, Freeport, Ill.

**LECTRIK** Silver Kleener Atomic Metal Electrode Plate (magnetic principle). De-tarnishes silverplated ware (and other metals) quickly. Simply dip, rinse, dry. Agents wanted. Part or full time. Nu-Process Products, Aurora, Ill.

**FREE** sample! Big profit opportunity with amazing Glow-In-The-Dark House Numbers, switch plates, pictures, decals, religious articles. Represent large manufacturer. Madison Mills, 303 Fourth Avenue, New York 10, N. Y.

**AT** last! Something new and sensational in Christmas Cards. Gorgeous satin, velour designs never before offered. Amazing value! Gets orders fast. Name imprinted Christmas Cards 50 for \$1.00 up. Big profits. 30 other assortments 60c to \$1. Imprinted Stationery. Samples on Approval. Puro Co., 2801 Locust, Dept. 841-J, St. Louis, Mo.

**IF** you work in a factory or shop, you are passing up the opportunity of a lifetime to build a steady Extra Income by selling subscriptions to Popular Science Monthly to your fellow employees. For Free kit and complete instructions write on a postcard to—Manager of Agents, Dept. A148, Popular Science Publishing Co., Inc., 353 4th Ave., New York 10, N. Y.

**DENTAL-Stero**—The New Toothbrush Holder and Sterilizer for money-making salesmen. Used in every home! Big profits. Write Dental-Stero Company, 3908 Secor Road, Toledo 6, Ohio.

**GUARANTEED** product in protected territory, if you are now selling or intend to sell house-to-house. For full 1 Qt. Sample amazing High Shine Windsor No Rubbing Wax, send only 25c covering handling and postage. (Sells for \$1.25). Windsor Wax Co., Inc., Dept. P.S.-2, Hoboken, N. J.

**NATIONAL** Organization wants men to distribute food specialties and ingredients used extensively by industrial manufacturers, institutions, bakers, bottlers, confectioners, ice cream manufacturers, etc. Ambitious men can start a guaranteed business of their own with small working capital. For complete details write Wetherholt Co., Evanston, Ill.

**AGENTS** wanted to sell nationally advertised Pocket Atomizers. Just four sales daily net \$50.00 weekly. Write Dept. S.C., Louell Products Co., 423 Fulton Street, Brooklyn 1, N. Y.

**CANVASSERS** make to \$36 cash daily. New electric device, everyone needs. We deliver, sample kit \$2.00. Sibert Company, Newark 3, N. J.

**BIG** profits. Start your own business. Stamping key protectors. Sample with name and address 25c. Catalog free. General Products, 11 No. Pearl (PS), Albany, New York.

**BIG** money. Sell friends, others, exclusive Christmas card assortments, unobtainable elsewhere. Profits to 100%. Bonus. Request free samples, exclusive 50 and 25 for \$1.00. Name imprinted Christmas cards with Christmas and Everyday assortments on approval. Regal Greetings, Dept. PS-2, Hazel Park, Mich.

**ATTRACTIVE** offer \$19.50 electric razors, each one packed in overnight case \$2.25. We deliver free anywhere in U. S. United Company, 404 W. Franklin St., Baltimore 1, Maryland.

**MAKE** money easily. Fast-selling line 50 new boxes Christmas, Everyday Cards, Stationery. Unusual Christmas Carol, Americana, Etching, "Flocked" Initial Stationery, others. Profits to 100%. Bonus. Special money-saving offers. Experience unnecessary. Write today for Christmas Leader assortment on approval and free samples 5 different name imprinted Christmas card lines. Personal, Floral Stationery. Elmira Greeting Card Co., M-10, Elmira, N. Y.

**MAKE** money fast! Sell Christmas cards to friends, neighbors, others. Big variety etchings, religious, 50 for \$1.00, wrappings, stationery. New \$1.25 line "Little Ones." Flower box, plastic frosted, Saints 'n' Sinners. Special offers, bonus. Fund raising opportunity for individuals, clubs, churches, schools. Mail postal today for feature 21 card \$1.00 Christmas assortment on approval. Hedenkamp, 343 Broadway, Dept. Y-43, New York 13.

**BE** a jobber, sell brushless auto enamels to retailers. Car or bicycle helpful. High earnings on our capital. Sterling Chemicals, Middletown 98, Conn.

**BIG,** easy profits to 100% selling new, Novel Christmas card, Gift Wrapping, Panorama, Christmas Carol assortments. Bonus. Special offers. Request free samples 50 for \$1.00 Personals. Silver Imprint line. Name Imprinted and Floral Stationery and Feature Christmas samples on approval. New England Art Publishers, North Abington 172, Mass.

**SELL** ultra-blue stock signs to stores. 1000 slogans, comedy, general, religious. "7x11" cost 6c—Sells 35c—Make money. 15 samples Ultra-blue signs "7x11"—\$1.00 postpaid. L. Lowy, 8 West Broadway, Dept. 398, New York City 7.

**BAGS,** Cups, Paper Products, Etc. Easily sold to merchants from your car or truck. Big profits! American Paper Company, Washington 2, D. C.

**INCOME** from local information. No selling. Neher Company, LaVerne 6, Calif.

**FREE** nylons given if Kendex hosiery runs or snags! World's only women's hosiery sold with a written guarantee that amazes everybody. Mere words could not possibly express the almost unbelievable opportunity you now have to make money. Fantastic and "impossible" earnings now become a reality. Can you imagine a guarantee that replaces hosiery regardless if damage is due to use or abuse and regardless whether it is the fault of the hose or the wearer? Here is sales dynamite that will blast your earnings to the sky! Even if you never sold a thing in your life, three magic words: "Guaranteed Against Everything" will open doors for you—will make women listen and will pour money in your pocket. Kendex stockings are not sold in stores, so you have no competition. Complete line includes beautiful sheer nylons; long wearing, durable service nylons; three different lengths; genuine outsize nylons; latest shades; choice of full fashioned with seams or seamless; lowest priced rayons. Also separate complete line of men's hosiery including nylon, lisle, rayon, cotton, mixtures, etc.; plain and fancy; long and short. Thousands of pairs shipped daily. No money or experience needed. Nothing to invest or risk. No samples to buy. Nothing to pay, now or later! Simply write orders. We deliver and collect. Liberal advance cash plus huge cash bonus. Write orders spare or full time; exclusively or as a side line. Become a manager and appoint others to sell for you with steady income on their sales! Complete money-making outfit, including sales books in colors, samples cut from actual hose, instructions, order blanks, etc. furnished free and prepaid. Rush name and address on postcard and start making money next week. Kendex Co., Babylon 156, N. Y.

**INFORMATION** — Wholesale supply sources. Money-making plans. Increase your income. Write Reynard Station, Smithfield 3, Ohio.

**GREETING** Card money-makers. Christmas, Birthday, Relations. Catalog free. Greenport Art Company, Dept. 876-C, Brooklyn 15, New York.

**PLASTIC** Christmas cards. Exclusive new plastic, sachet, panoramic, and carols Christmas assortments. Five leading 21 card \$1.00 feature assortments. Six portfolios of personal cards. All this plus America's fastest imprint service. Free samples. Elmcraft Card Co., 5930 South Western, Chicago 36, Ill.

**AMAZING** Offer—\$40 is yours for selling only 50 boxes, each containing 25 new entirely different Deluxe Christmas cards with or without name imprinted. Also 50 for \$1.00. Free samples. Other boxes on approval. Write today. It costs nothing to try. Cheerful Card Co., 355 White Plains, New York.

**FACTORY** Representatives. Power units. Drop shipments. Liberal commissions. Farm Products, M-2017, Excelsior Springs, Missouri.

**WOULD** you pay 3%—first \$350 made? Color-illustrated book "505 Odd Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific, Oceanside, California.

**IMMEDIATE** cash! Our magnificent plastic front Hardwood Photo Plaques bring quick profitable orders. Gotham Products, Box 5427a, Philadelphia 43, Pa.

**\$25 YOURS** for selling only fifty \$1.00 boxes, new exclusive different Christmas and all-occasion cards; also extra cash bonuses. Send for Champion Cheerio 21-card box on approval. Free samples 6 new personal groups and stationery. Write today. Dept. 37, Pen-Brush, 154 Nassau St., New York 7.

**AGENTS** distributors. No-glo plastic linoleum finish. Acme, Box 404-PS, Mount Vernon, N. Y.

**CALL** on filling stations, garages, with fast selling automobile item. Generous commission. Free particulars. Wasco Manufacturing, Box 111, Blue Island, Illinois.

**FOR** easy honest cash without canvassing. Write, Terrill, Bogard 1, Mo.

**REAL** Silver plating polish instantly silverplates and polishes by rubbing. Highly profitable, fast seller. 2½ oz.—\$1. Kalenak Products, Nanty-Glo, Penna.

**SELL** famous \$3 "Fire-Killer" extinguisher with bracket, wholesale or direct; exclusive territory. "Fire-Killer," Syracuse 1, N. Y.



**MAKE** Sensational profits! New, sell-on-sight plastic line: Tablecloths, aprons; many other splendid fast-selling items, novelties. Postal brings free details, special deals. Hurry! Royalty, Box L-748, Passaic, N. J.

**COUNTRY** going wild over our retractable ball pen-cigarette lighter combination. Retail \$1.00. Sampa Products Co., Dept. L, 1120 Brighton Beach Ave., Brooklyn 24, N. Y.

## 63 HIGHGRADE SALESMEN

**BIG** Money Taking Orders: Shirts, Ties, Sox, Pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AV Lincoln, Chicago.

**START** your own business on our capital. Always your own boss. Hundreds average \$6,000 to \$25,000 annual Sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. G-U-PSC, Freeport, Ill.

**EASY** sales—Big profits. Selling to stores sensational 4-In-1 comb set. Needed by every man and woman. Write for free literature and no-risk starting offer. Better Products Company, Marion, Indiana.

**BRAND** New! Revolutionary Products! Salesmen make \$10,000 yearly selling one complete lighting line. "Neo-Glo" Fluorescent changeable message sign replacing neon. "All-Lite" table lamp using upright fluorescent tube, spectacular "Circline" fixtures using circular tube. Verticals, Dual-Rays, Pin-Up Lamps, a complete line of fluorescent and incandescent fixtures covering every commercial, industrial, residential need. A triple sales plan insures your success whether you choose selling dealers, direct, straight commission or distributorship on our capital. Get set now with our growing progressive organization. To get you started, we will send a beautifully illustrated catalog showing over 200 profitable, salestested styles and models. Order blanks, sales helps, everything needed to start at once included. It costs you nothing. Rush name quickly—Today—and start making real money. Rose Company, 539 BB South Franklin, Chicago, Illinois.

**FANS**—Fans—Salesmen making \$50 to \$100 per day selling our Electric Fans and Sump pumps. Have also, all kinds of fan parts; build your own. Write Universal Fan Co., Peru, Ind.

**SALESMAN**—Put yourself in line for big money and real future. Keep stores supplied with 5c—10c counter goods. Nationally advertised merchandise. Top profits for you and merchants. Liberal deals boost sales. Sideline or full time. World's Products, Dept. 83-E, Spencer, Ind.

**REVOLUTIONARY** Product! Thousands prospects everywhere. Men earning up to \$250 week. Placed on free trial sells itself. Orders financed by factory. Special Demonstrator offer. John Wilson, 2433 Indiana Ave., Dept. 334, Chicago 16, Ill.

**NEW** opportunity—Earn big profits. Mailing and shipping cartons are used in every business. We will help you make easy sales, steady commissions on quickly repeating orders. Corrugated Paper Products, Inc., 617A Brooklyn Ave., Brooklyn 3, N. Y.

## 67 EDUCATIONAL AND INSTRUCTION

**HAVE** your own office! Many earn up to \$5,000-\$15,000 Annually. Learn credit-collection agency business by home study course. Experience unnecessary. Write for Free bulletin. No obligation. Franklin Credit School, Dept. 203-G, Roanoke 7, Va.

**BOOKKEEPERS!** Increase your earnings! Operate your own simplified "Dollar-A-Week" Bookkeeping and Tax Service. Full or Spare time. Details Free. No obligation. Ellis, Box 203, Cedar Grove, North Carolina.

**PIANO** tuners are in demand making big money. Learn piano tuning at home. Write Evansville School of Piano Tuning, Dept. C, 714 S.E. Second Street, Evansville, Ind.

**THIRTY**-day shorthand. 50c. Free sample. Cook's Uniscript, Bartow, Fla.

**LEARN** Dental technician trade. Ten simple lessons \$5.00. Grant Laboratory, R. Los Angeles 14, Calif.

**LEARN** typewriter repairing under G.I. Bill. Adding machine and Calculator courses available. For information write Dept. PS-7, Capitol School of Typewriter Mechanics, 1328 New York Avenue, N.W., Washington, D. C.

**EXPERT'S** gambling systems that never lose! Guaranteed! \$1.00. Silvers Publications, 804 Fifth, Youngstown, Ohio.

**NURSES'** Training School. Make up to \$30-\$40 week as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-7, Chicago.

**STYLE** is personality in letter writing. Send \$1.00 today for this and a free bonus book. Addison-Wesley Press, Dept. Z, Cambridge 42, Mass.

**AMAZING**, new information on your memory; famous feats of memory; Super-memory; free. Write today. Thor Books-CS-7, Box 1210, Chicago.

**LEARN** Piano Tuning. Prepare for Career in fascinating profession, \$5,000 year easily earned. Real security, pleasant easy work. No profession Paying so well can be mastered so quickly. Natural Aptitude, desire to get ahead chief requirements. Prospectus and full information on request. Harmony School of Piano Tuning, Box 582, Harrisburg, Pa.

**SEND** for free catalogue. Reppert Auction School, Box 142, Decatur, Indiana.

**USED** Correspondence Courses and Educational Books bought, sold, rented, catalog free. Educational Exchange, Summer-ville, Ga.

**AMAZE** others. Add columns instantly. Add faster than adding machine. Free details. Maths Institute, Box 463, Nashville 2, Tenn.

**MEDICAL** Laboratory Technicians in great demand. We train you in your own home, in your spare time. Also home study course in General Chemistry. Catalogue free. Imperial Technical Institute, Box 973-S, Austin, Texas.

**SPEED** and Skill in Radio Code to qualify for Amateur and Commercial Radiotelegraph License. Learn at home with the famous Candler System used to train radiotelegraph experts and champions. Good pay or fascinating and profitable hobby. Free Book, Candler, Dept. 6-H, Box 928, Denver, Colorado.

## 69 CONTESTS

**\$1,000,000 FREE**—Contests—Yearly. Win fortune. Winners prepare your entries—lowest cost. Research, 13 Earl Street, Red Bank, N. J.

## 70 LANGUAGE OUTFITS

**LINGUAPHONE** Makes Languages Easy at home. Learn to speak Spanish, Portuguese, Italian, French, German, Russian, by quick, easy Linguaphone conversational method. Save time, work, money. Linguaphone Correspondence Courses are available to veterans under G.I. Bill of Rights. Send for free book. State if G.I. Linguaphone Institute, 54 RCA Bldg., New York 20, N. Y.

## 72 AUTHORS SERVICE

**I WANT** New Writers to cash hundreds of checks for \$1 to \$100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for Free details. No obligation. Saunders M. Cummings, 467-S Independence Bldg., Colorado Springs, Colo.

## 74 CARTOONING, SIGN PAINTING, DRAWING AIDS

**"HOW** to make money with simple cartoons". A book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 197, Pleasant Hill, Ohio.

**SIGN** painting taught at home by an old master. Ben Kerns, Box 812, Greenville, S. C.

**SIGNS** made easily. Instructions and ten sets modern alphabets, numerals, patterns. Sizes up to eight inches. All for \$1.00. Co-operative Business, 7 West Madison, Chicago (2).

**9 ALPHABET** 3 Numeral Pattern Sets and Catalog \$1.00. Sign Letter Distributors, P. O. Box 101, Mineola, N. Y.

## 75 CHALK TALK-STUNTS

**CHALK** Talks, Laugh Producing Program, \$1.00. Illustrated Catalog 10c. Cartoonist Balda, Oshkosh, Wisconsin.

## 76 TYPEWRITERS

**RECONDITIONED** Typewriters. Printing Devices. Office Appliances. Supplies. Dixiegraph, King, N. C.

## 78 RUBBER STAMPS

**DELUXE** Cushioned, indexed, knob handle; Three lines \$1.00, two 75c. Quick Service, Catalog 10c. Warner Stationery, Box P-43, Havre de Grace, Maryland.

**3 LINES**, Cushioned, indexed, 50c. Signatures \$1.95. Printright, Wauwatosa, Wis.

## 79 PRINTING OUTFITS, SUPPLIES

**"PRINTOMATIC"** Self-feeding Post Card Stencil Printing Duplicators \$9.50 Up. Office Size Duplicators, Speedoprints, Hilcos, Excellographs \$33.41 Up. Literature Free. Pittsburgh Typewriter Supply, 336 WE Fourth Ave., Pittsburgh 22, Pa.

**PRINTING** outfits, type. Send dime for illustrated supply book. Kelsey H-8, Meriden, Connecticut.

**INEXPENSIVE** home-made printing press. Details free. Novelty Shop, Downs-ville, Louisiana.

**PRINTING** Presses, Type Supplies, Lists 3c. Turnbaugh Service, Loysville, Penna.

**GOLD** Imprinter \$3.25. Samples 10c. Lagarza, 8 Walden, Cambridge 40, Mass.

**MAKE** your own printing cuts. Newly invented Plexiplate Process. Plexiservice, Argyle (2), Wisconsin.

## 80 PRINTING, MULTIGRAPHING, ETC.

**BUSINESS** Stationery—100 full size letterheads, 100 envelopes, printed on best bond. Postpaid \$3.00. Watson's, Latta, S. C.

**SIXTY** letterheads, forty envelopes, beautifully printed, \$1.00. Calder's, Box 3422-PS, Phila. 22, Penna.

**PHOTO**-offset printing: Business forms, circulars, handbooks, copy duplicating, varityping. Reasonable rates. Jayko Lithographers, Adams, Mass.

**QUALITY** printing at low prices! Send for price list today! Nationwide Printing Company, Dept. P.S., 2337 Bath Avenue, Brooklyn 14, N. Y.

**1,000 BUSINESS** cards printed prepaid \$2.50. Reliable Print Shop, 907 E. Jefferson, Louisville, Ky.

**SEND** 10c Now, for our 48 page price-list—Refunded first order. McCall Press (PSM), 1326 South 27th, Omaha 5, Nebr.

**SELL** Printing, Amazing Profit. Mango, 555-B South 20th, Newark 3, N. J.

**QUALITY** Printing: Business, personal stationery. State requirements. Samples. Mero Products, 99 Morrison, Punxsutawney, Penna.

## 82 PATENT ATTORNEYS

**INVENTORS**, For "Record of Invention" form, contact Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

**INVENTORS**: Write for free brochure "Evidence of Invention." Labiner, World Building, New York 7.

**INVENTOR'S** Guide free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York 7, N. Y.

**INVENTORS**: When you are satisfied that you have invented something of value write me, without obligation, for information as to what steps you should take to secure Patents or Trademarks. Write Patrick D. Beavers (Formerly Randolph & Beavers) Registered Patent Atty., 938 Columbian Bldg., Washington (1), D. C.

**C. A. Snow & Co.**—S-427, Snow Building, Washington 1, D. C. Registered Patent Attorneys. Write for information.

**PATENT** practice before U. S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 413, 815—15th St. N.W., Washington 5, D. C.

**PATENTS**—Trade marks, Irving L. McCathran, 316 McLachlen Bldg., Washington 1, D. C. Registered Patent Attorney.

**INVENTORS**: Without obligation, write for information explaining the steps you should take to secure a Patent. John N. Randolph, Registered Patent Attorney, 207 Columbian Bldg., Washington 1, D. C.



**INVENTORS:** Learn how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 82B-G District National Building, Washington, D. C.

"PATENT Protection for Inventors" booklet outlines steps to take to secure patent protection for your invention. Send for copy. No obligation. Victor J. Evans & Co., Merlin M. Evans, Registered Patent Attorney, 341-G Merlin Building, Washington 6, D. C.

IF an inventor believes he has an invention, a search of the most pertinent prior U. S. Patents should be made and a report obtained relative to its patentability. Write for further particulars as to patent protection and procedure and "Invention Record" form at once. No obligation. McMorow, Berman & Davidson, Registered Patent Attorneys, 1435 Victor Building, Washington 1, D. C.

**INVENTOR'S** report for inventors. Result twenty years protecting inventions. \$2. Rlamb, 66 King, Hillside, New Jersey.

### 83 FOR INVENTORS

"INVENTOR'S Guide" free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York 7, N. Y.

**INVENTORS:** Without obligation, write for information explaining the steps you should take to secure a Patent on your invention. John N. Randolph, Registered Patent Attorney, 206 Columbian Bldg., Washington 1, D. C.

**INVENTORS:** The usual First Step is to have a search of the U.S. Patents conducted, so I can report on Patentability. Write, without obligation. Patrick D. Beavers (Formerly Randolph & Beavers) Registered Patent Atty., 939 Columbian Bldg., Washington (1), D. C.

**INVENTORS:** If you have an invention for sale, patented or unpatented, write Institute of American Inventors, Dept. 30A, 1926 Eye St., N.W., Washington 6, D. C.

**PATENTED**, unpatented inventions promoted. M. Joyce Humphries, 1424 Landtitle, Phila. 10, Penna.

**INVENTORS:** Learn how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 82A-G District National Building, Washington, D. C.

**INVENTORS.** A patent is a valuable right. Send for booklet, "Patent Protection for Inventors", Outlining the preliminary steps to take to obtain patent protection. Victor J. Evans & Co., 342-G Merlin Building, Washington 6, D. C.

IF an inventor believes he has an invention, a search of the most pertinent prior U. S. Patents should be made and a report obtained relative to its patentability. Write for further particulars as to patent protection and procedure and "Invention Record" form at once. No obligation. McMorow, Berman & Davidson, Registered Patent Attorneys, 1436 Victor Building, Washington 1, D. C.

**PATENT** searches—reliable, efficient, air mail service—\$8.00. Write for free invention protection form. Patent Research Service, 703 Albee Bldg., Washington 5, D. C.

**INVENTIONS** protected in thirty days. Cost low. Particulars free. Patents News, Dept.-F, Washington 12, D. C.

IF you have an idea for a new product take advantage of our expert advice. Free booklet "O" tells you how we can convert your ideas into commercial products, fully protected, and introduce them to reliable manufacturers. Elo Development Co., 29-28 41st Ave., L.I.C.1. IR 6-6219.

**INVENTORS—**Save \$50 to \$250. Eliminate need for assistance in obtaining your patent. Complete Handbook \$2.00. International Patent Library, 318 Evans Building, Washington, D. C.

**CASH** For your idea. 280 manufacturers need inventions, patented or unpatented. List free. Invention Bureau, 208-S Clinton, Oak Park, Illinois.

### 84 INVENTIONS WANTED

**INVENTORS:** Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information, free. Institute of American Inventors, Dept. 30C, 1926 Eye St., N.W., Washington 6, D. C.

**INVENTIONS** Promoted, Patented or unpatented. Write Adam Fisher Company, 183-A Enright, St. Louis, Mo.

**PATENTED**, unpatented inventions wanted. We have tremendous lists of manufacturers who may pay cash, royalties. Descriptive booklet free. National Invention Service, 1404-B Mitchell Street, Oakland 1, Calif.

**FREE** Service. Invention Development & Sales Counsellors, 126 Lexington, N.Y.C.

**HIGHEST** royalties—cash. Free booklet. Universal Marketing Co., 126 Lexington Ave., New York 16, N. Y.

**INVENTORS!** Have you good patentable ideas? Write Patent Agent Metzler, 11 West 42nd, New York.

**SMALL** Inventions wanted by manufacturers. I'll help you sell your invention. Write for circular. S. Hull, 7829 Euclid, Cleveland, Ohio.

**CASH** For your idea. 280 manufacturers need inventions, patented or unpatented. List free. Invention Bureau, 208-S Clinton, Oak Park, Illinois.

**SELL** Your Invention! Patented or Unpatented! Free information. Sales Research Company, Suite 1102, Chicago Building, State and Madison Streets, Chicago 2, Illinois.

### 85 PATENTS

**INVENTORS:** Test the commercial value of your patented or unpatented inventions, quickly and inexpensively. Write for free information. Institute of American Inventors, Dept. 30-B, 1926 Eye St., N. W., Washington 6, D. C.

### 88 MANUFACTURING

**MODELS** small lot manufacturing, metals, plastics, etc., Milburn, Burlington, Ky.

### 89 MODELS, MODEL SUPPLIES

**MOST** complete Illustrated Catalog—"O-HO OO" Model Railroad Parts ever published. Send 5c for mailing. Selley, 1377 Gates Ave., Dept. 836, Brooklyn, N. Y.

**MODEL** Ship Builders! Are you looking for authentic, precision ship models? Send for richly illustrated fully descriptive catalogue in full color of famous ships of all kinds. Only 25c. Halesite Yacht Service Inc., Dept. C-43, Halesite, Long Island, N. Y.

**SHIP** and Yacht model fittings; blueprints. Send 25c for illustrated catalog No. 21—Listing hundreds of items. A. J. Fisher, 1002-2 Etowah Ave., Royal Oak, Mich.

**RADIO** Control Planes. Complete. Less than \$100.00. 10c please. Hobby Center, 12240 Gratiot, Detroit.

**BUILD** Historic Ship Models. Complete Kits 39c to \$8.50; Send 10c for catalog. Ideal Models, 21 West 18th Street, New York 11, N. Y.

**SHIP** Model and yacht supplies, complete large 64 page catalogue, 30c. Wm. Wild, 610 E. 11th St., New York City.

**SHIP** Models—Most complete line in New England of kits, parts, plans and books. Steam and electric power plants for working models. Big catalogue 25c. Dept. S, James Bliss & Co., Inc., 220 State St., Boston, Mass.

**SHIPMODEL** kits and fittings of authentic design and detail. Model kits include brigs, fisherman, cutter, clipper. New catalog. 15c. Model Shipways, Folio 40, 476 Main St., Port Lee, N. J.

**RAILWAY** models, complete line. Combined HO and O gauge, catalogue, 50c. Walther, 241 Erie, Milwaukee 2, Wis.

**TT GAUGE** Model railroads. Operating layout on a tabletop. Send for free illustrated folders. John Boyle Sons, 102 S. Wyoming St., Hazleton, Pa.

**COMPLETE** Line of Mechanical Equipment for Model Motor Boats. Write for circular. Morristown Boat Works, Bank Street, Morristown, New Jersey.

**ENGINE** steam, miniature working model. Brass and iron. Bore 9/16; stroke 11/16; weight 2 lb. Assembled \$17.50. Steam Boiler for model engines. Uses Sterno. Withstands 300 lb. pressure. Cast bronze, silver soldered. Complete with pressure gauge and fittings. \$22.50. Ross, 68 West Broadway, Section B, New York 7, N. Y.

**PATENT** models, experimental devices constructed. Reasonable. Nelson Manufacturing, Woodburn, Oregon.

### 90 MOLDS AND MOLDING MATERIALS

**CREATE** your own products. Our "Flexible Mold Master" teaches amazingly simple method for making flexible molds for plaster novelties. Complete with illustrations. \$1.00. Emco Enterprises, 6750 Stony Island Ave., Chicago 49, Ill.

### 91 HOME CRAFTSMEN

**LAWN** Chairs, Toys, Novelties, Garden figures, Furniture, etc. 68 popular plans and patterns. \$1.00. Mastercraft, 7S, 7041 Olcott, Chicago 31, Ill.

**GENUINE** Swiss Musical units \$3.25. Musical Albums-boxes, 131 West 42nd, New York 18.

**PATTERNS:** Lawn Ornaments, Weathervanes, Letters, Numerals, Silhouettes, Plaques, Frames, Toys, Jig & Bandsawed Plywood Novelty Furniture, Craft-Hobby Books-Booklets, Decals, Tools, Etc. Further details free. Wo-Met Shop, Ashburn, Georgia.

**COPPER** and Brass Materials. Complete line for Craftsmen and Workshops. Catalog Free. Groundmaster Company, Boulder, Colorado.

**LEATHERCRAFT!** Complete stocks of leathers, tools, supplies. Immediate shipment. Free catalog. Kit Kraft, Dept. 3203 W. Washington Blvd., Los Angeles 16, Cal.

**PICTURE** frames—Make your own—Details free. Frame Shop, 1134-A Las Palmas, Los Angeles 38.

**LUMINOUS** Pigments (powders). Glowwell Co., 475-N Fifth Ave., New York 17, N. Y.

**CASTINGS**, make your own, bronze, aluminum, etc., Price list supplies and equipment free. Lehnert Company, Norwood 3, N. J.

**CRAFTSMEN'S** deals, Mahogany and other cabinet lumber. Veneers of all kinds. Sedlo Company, P. O. Box 7161, New Orleans, La.

### 92 BLUEPRINTS AND PLANS

**SPECIFICATION** & Prints of the first successful permanent magnet motor \$10.00; Plus right to make model. Send ten cents for literature. George J. Altman, 150 Broadway, New York 7.

### 93 BUILD IT YOURSELF

**STREAMLINED**, Built-in kitchen cabinets to fit any kitchen. Complete, easy to understand detailed plans and specifications showing "professional" construction methods. All for \$1.00. Thombert Co., Box 447A, Newton, Iowa.

**BUILD** at home, inexpensive, practical concrete block machine, Motor or hand. Write. Clyde Lee, Mountain View 1, Oklahoma.

**MAKE** your own handy lightweight Concrete Blocks quickly with new Blockmaker. Circular stamp. Manual 25c. Peerless, New Lenox 1, Illinois.

**BUILD** concrete block machines, portable saw mills, shop, home, farm machines. 183 plans. Catalog handbook free. Nichols Equipment Co., Dept. 1304, Purvis, Miss.

**ANY** man can build solid concrete foundation under house without help. No jacking up or broken plaster. Simple instructions and drawings explain clearly. Price \$2.00. Robert C. Densel, Convoy, Ohio.

"**CONCRETE** Block Homes." 32 page booklet: drawings, instructions on how to build. \$1.00. H. C. Lightfoot, Civil Engineer, Richboro, Penna.

**BUILD** power lawn mower from spare parts. Complete drawings and instructions \$1.00. L. Wishop, Box 304, Rockton, Illinois.



## 94 WATCH REPAIRING

**WATCHMAKERS' Journal** contains valuable information for watchmakers. Latest issue 15c copy. Dean Co., 116 Nassau St., New York 7, N. Y.

## 95 OLD GOLD, WATCHES, ETC.

**HIGHEST Cash** for old, broken jewelry. Mail Gold Teeth, Watches, Rings, Silverware, Diamonds, Spectacles. Satisfaction Guaranteed. Free Information. Rose Smelting Co., 29-Y East Madison, Chicago.

**CLOCKS.** U. S. Navy Surplus. 8 Day, sweep second, Chelsea. Reconditioned and guaranteed for year. Postpaid \$18.00. Max Zweig Sons, 937 D St. N.W., Wash., D. C.

**WATCHES.** wholesale; Rebuilt Elgins, Walthams, Bulovas, etc., new and used Railroad, Stop, diamond, rhinestone, \$9.50 up. Catalogue free. Brookins, B-1975TG, Little Rock, Ark.

## 96 JEWELRY

**JEWELRY Findings.** Lowest Prices. George Sassen, 154 Nassau Street, New York 7.

**CERAMIC Jewelry Supplies.** Bar Pins, ear screws, for ceramic and woodworkers, also, glass and sea shell assemblers. Free catalog. Philadelphia Badge Co., 1007 Filbert St., Philadelphia, Pa. Dept. E-1.

**STUN** Your friends with genuine, sparkling, brilliant-white Zircons. Cut, polished, mounted just like diamonds. Amazing diamond-like appearance. Top-quality. Hard for even experts to tell the difference. Beautiful settings 14K gold. Over 100 gorgeous latest-style rings to choose from. Attractive low prices. Send for big Free Catalog. U. S. Zircon Syndicate, 139 N. Clark, Dept. 16, Chicago 2.

**RHINESTONES — Moonstones — Pearls — Findings.** Free literature. Herber, 1360-B Hicks, New York 67.

**SEMI-finished cowboy buckle sets** rings, etc., in silver. Will cast 10 or 10,000 items in gold or silver from your model or drawing. Free circular. Southwestern, Box 3506, Station A, El Paso, Texas.

## 97 TOBACCO & PIPES

**ATTENTION! Pipe smokers.** For a cooler, dryer smoke, try a Dribole spring. Ends clogged stem 25c. Write 8526 3rd Ave., Brooklyn 9, N. Y.

**ATTENTION! Smokers!** Now available Turkish water pipes. See display ad on page 53. \$2.95 plus postage. Acme Sales Service, Box 41, Ridgewood Sta., Brooklyn 27, New York.

## 98 RAZOR BLADES, SHAVERS

**100 DOUBLEDGE blades** with Razor. \$1.00. Earl Sales Co., 925 Rim Road, Los Alamos, New Mexico.

**ELECTRIC Shavers Repaired—One day service.** Trade-allowance on old shaver. Shoppers Shaver Service—426 State Street, Madison, Wisconsin.

## 100 MISCELLANEOUS

**MEN! Large size shoes, large size socks.** We specialize in large sizes 10 to 16, widths AA-EEE. Oxfords, Hi-tops. Work shoes. Guaranteed extra quality. Free Catalog. Kingsize, 553 Brockton, Mass.

**PANNING Gold.** Modern methods. Two instruction booklets, 25c. Old Prospector, B-129, Dutch Flat, Calif.

**"HOW To Win Prize Contests"** Amazing Booklet \$1.00. Box 24EPS, Jackson Heights, New York.

**GROW** all the potatoes your family can eat in plot of ground 6' x 8'. Amazing new method—no digging. Send \$1.00 for complete instructions. Gardener, 1012 S. Staples, Corpus Christi, Texas.

**GUARD** against moth. Cedarize your home. \$1.00 per bottle. George Hartels, RD 4, Somerset Pike, Johnstown, Pa.

**PLEXIGLAS 1/4"** sheet clear, slightly curved, special \$1.10 per sq. ft. Trojan Plastics, Troy, Ohio.

**SPONGE.** Soft plastic, ideal for washing walls, woodwork, automobiles, etc. \$1.00 postpaid. Rustee Products, 701 W. 37th St., Chicago 9, Ill.

**LEVELING jobs?** New \$3 device does all. Quickly, easily, accurately. Postcard brings details. Aqua-Level, Taylorsville 1, Calif.

**EUREKA! Flask filled Gold Ore.** \$1.00. Black-Hills Enterprises, Deadwood, South Dakota.

**HULL Automobile Compass.** Value \$4.95, brand new, \$2.50. Prisms for 6x30 or 8x30 binoculars, brand new, \$1.50 each. Offset prisms to be attached to 7x50 B & L Binoculars, gives double the field of the ordinary 7x50 binocular. Cost \$98.00, special \$25.00. Green sunshades for binoculars, size 6x30 and 7x50, snap on type, value \$7.50, special \$1.25 per pair. Forward money order. No C.O.D. shipments. Send 25c for catalog of new and used guns, ammunition, binoculars and powder flasks. Public Sport Shops, 11 S. 16th Street, Philadelphia, Pa.

**ABACUS.** Now improved and easier to use. An interesting way to learn arithmetic. A fast way to add, subtract, multiply, divide, and extract square roots. Specially illustrated instructions show how. New model, \$3.50. Send for free lesson and details. Loy's Chinese Calculator, Dept. 848, 1317 Rhode Island Ave., N.E., Washington 18, D. C. Agents Wanted.

**MEN! Brockton made shoes.** Any size, width, color or style \$7.95. Finest quality. Why pay more? Send money order we pay postage, you pay postage if C.O.D. Malcav Co., Box 918, Brockton, Mass.

**FRIENDSHIP** is priceless. 10c will bring you copy of my Friendship Magazine, bet you'll like it. Write Jay Wilcox, Box 384, Eastport, N. Y.

**ALASKAN PHOTOS.** See for yourself. Interesting, Educational, Collectors items. Sample 50c. 6 for \$1.00. Wain, 7-PS, Gen. Del., Anchorage, Alaska.

**SAVE 25% fuel heating hot water** regardless of make or type. Proven plan \$3.00. Evergreen Service, Box 37, Brooklyn 22, New York.

**HERBALISM—Complete course** in 2 volumes. 1000 recipes. Particulars free. Home Service, Forestville 23, Va.

**ARMY Twenty U. S. Shoulder Patches** \$1.00. Springer's, El Paso, Texas.

**HYPNOTIZE! Control the minds and actions** of others! Completely illustrated course \$1.00. Money Back guarantee. Fowler, Box 1284, Boston 4, Mass.

**CACTUS.** box of 5 varieties \$1.00 postpaid. free catalog. Mexican Curios. Springer's, El Paso, Texas.

**HOW to Hypnotize!** Amazing, easy-to-learn illustrated self-study lessons. Complete course—includes: hypnotism over telephone, on stage, conquering timidity, dominating others. Teaches you how to develop your personal power. Sensational value, only \$1.95 postpaid; \$2.25 C.O.D. Satisfaction Guaranteed! Order "Hypnotism Course" today. Nelson Company, 1139 Wabash, Dept. 3-G01, Chicago 5.

**ART Photos! Sample 50c.** 3 for \$1.00. Post Office Box 2011, Phoenix, Arizona.

**MEDICAL Laboratory Technicians** in great demand. We train you in your own home, in your spare time. Also home study course in General Chemistry. Catalogue free. Imperial Technical Institute, Box 973-S, Austin, Texas.

**ORDER** these wonderful luminous glow in the dark home necessities now. House numbers—15c ea. Pendants—10c. Lite SW. plates—25c. Outlet Plate—25c. No C.O.D.s. Route 1, Box 528, St. Petersburg, Fla.

**LOCKSMITHING.** secrets, key fitting, lock repairing, opening, prices, sources. Illustrated book \$1.00. Wexler, 7 W. 36, N.Y.C.

**ALLURING pin-up girl close-ups** in unretouched natural poses by professional female models. Sent in plain envelope. Six different wallet size—25c or six large 8 x 10 suitable for framing—\$1.00. Box 862, East Pittsburgh, Pa.

**SUN Glasses.** Unbreakable lens, smartly styled. Guaranteed satisfaction. \$1.00. Specify for Lady or Gentleman. Hollywood Distributors, P. O. Box 1821, Hollywood, Florida.

**DANCE instruction** in the privacy of your own home. Free booklet. Engstrom Dance Studios, Box 358, S2, Grand Island, Nebraska.

**GOVT. Surplus protective Hoods.** For Fishing, Sports. 2 for \$1.00 postpaid. "ME," 13750 Hart, Van Nuys, Calif.

## 102 WANTED MISCELLANEOUS

**MERCURY—Highest prices.** Free Containers. Write Mercury Terminal, Norwood, Mass.

**ANYTHING of value.** Armond, 207 North Fifth Street, Springfield, Illinois.

## 103 FOR THE HOME

**INCREASE** the value of your home with Ornamental Ironwork. Free circular. Berry's Products, Parkersburg, W. Va.

## 104 PERSONAL

**HOW** You can find out! Information discreetly developed. Any matter, person, problem, anywhere. Personal-Business assignments, representations undertaken. Nationwide. Officially licensed, bonded service. Established 1922. Reasonable. Confidential. William Herman, 170 Broadway, New York.

**BORROW** by mail. Loans \$50.00 to \$300.00 to employed men and women. Easy, quick. Completely private, confidential. No endorsers. Repay in convenient monthly payments. Details free in plain envelope. Write State Finance Co., 320 Securities Bldg., Dept. G-14, Des Moines 9, Iowa.

**RUPTURED?** Positive comfort, no understraps, no steel, no elastic. Write Smith Manufacturing Co., Preston, Ontario.

**BUY Vitamins Direct.** Amazing Savings. Money Back Guarantee. Our 9th year! Postcard. Matoska Products, White Bear Lake, Minn.

**LETTERS** forwarded 25c each. Remit stamps. Box 1922, Cristobal, Panama Canal Zone.

**MAIL** forwarded from Asbury Park, N. J. 25c per letter. Box 173, Allenhurst, N. J.

**BALDNESS—can it be prevented?** 1,500-word booklet absolutely free. Write Vanguard Research Reports, 3009-D Military Road, N. W., Washington 15, D. C.

**WHAT** will half a dollar buy? Send 50c and get a surprise. Bernard Klein, 839 N. 7th St., Phila., Pa.

**BAGDAD** reforwarding service. Airmail details 25c. Edward Basry, Bagdad 40, Iraq.

**CREATIVE Psychology** can change your world as you would wish to have it. New, different, gets results. Thrilling details free. E. Jay Beacom, Box 177, New Brighton, Penna.

**HAIR** Falling? Dandruff? Write Trichologist, 139 Lewis Street, Phillipsburg, N. J.

**NEW YORK City Confuse friends.** 5 Cards mailed \$1.00. 10—\$1.50. Letters remailed, 25c. \$2.00 monthly. Free details. Jaffe, 475-5th Ave.

**STOP Tobacco!** Cigarette habit broken quickly, pleasantly. Best formula science knows. Booklet scientific instructions \$1.00. Psychogenic Science, Dept. A, Box 402, Canton 1, Ohio.

**MAIL** Forwarded from Miami Beach, Florida. 25c per letter. Box 618, Hialeah, Florida.

**MAGAZINE** for single people 50c. 6 mo. \$1.00. Barwood, 2037PS 42nd, Astoria, N. Y.

**ART.** Scenic photos. Sample 35c. 4—\$1.00. Color Slides 50c. 3—\$1.00. Movies—Sample. Brochure 25c. Novelty, 1227 E. Van Buren, Phoenix, Arizona.

**INFORMATION** for single people by Human Relations Consultant. University Graduate, Dr. B. Long, Box 375, Los Angeles 53, Calif.

**PERSONAL Problems?** Let me help you solve them. \$2.00. Goldenhorn, 71 Broom St., N.Y.C.

**VETERANS** own your own business, free details. Nimitz, 4253 Austin, Milwaukee 7, Wisconsin.

**GLOBAL** viewcard supply; worldwide letter remailing service. Free particulars. Travelpost, Box 1436, Brawley, California.

**FACTS** about Bible; Apocrypha. 50c. Bulletin, Box 87, Cathedral Station, New York 25.

**MEXICAN law.** General practice attorney. 1203 Arizona Street, El Paso, Texas.

**HEALTH,** longevity, free literature. Hygienic System, 55 George, Lambertville, N. J.

**REMAKE Yourself** in every possible way: Personality, health, strength, poise, confidence, spirit, appearance, happiness and success. All can be done only if personalized to each individual needs in systematic methods. Every writing different to suit needs of each applicant. All problems dealt upon. Confidential. Send \$20 for return mail form to be filled. Box 541, So. Bend, Indiana.

**FROM** South America, air mail forwarded, 30 cents each. A De Leon, Grano de Oro, Maracaibo, Venezuela.



MAKE Friends everywhere. Copyrighted literature explains easy method. Free information mailed to single, interested persons. Write Strone, Box 157-PS, New York 11.

#### 105 ADVICE

DENTAL Plates loose? Don't risk Cancer, hearing, other troubles. Literature free. Laboratory, 908 Market, San Francisco, California.

WITHOUT sending money, promise: "Will not exercise cosmic consciousness power to injure anyone." becoming my student, receiving immediately \$2.50 book for study. Learning scientific instantaneous healing and "success" demonstration. When fully satisfied demand next lesson. Failing satisfaction within month, discontinue study, return book, owe nothing. Otherwise, when satisfied, send check for book. Crane, Publisher, Kingsport 1, Tenn.

#### 106 ADVERTISING

ADVERTISING Sensation! Reach 2,100,000 families, \$32.90 inch. Display, classified, ratebook (newspapers, magazines, mailing lists), advertising assistance, free. Chicago Advertising Agency, 20-PS, West Jackson, Chicago 4.

24 WORDS in 64 Weeklies \$4.96, J. Darnell, 730 Hays, Jackson, Tenn.

ADVERTISE: 24 words, 40 Newspapers \$3.50. Lists free. Advertising Bureau, 229-F Dixon, Uniontown, Penna.

#### 108 GENEALOGY

PRESERVE your family tree. Record that priceless data and lines of descent on a Galloway Ancestry Chart. Beautifully lithographed on durable bank bond. Convenient separate colors trace each line. Complete with jacket envelope. \$1.00 each, postage paid. Galloway Ancestral Charts, 605 N. Oakland, Pasadena 4, Calif.

#### 113 DRAFTING

SAVE on drafting materials. Free catalog. Draftsmen's Supply Co., 187 W. Madison, Chicago 2.

#### 115 DRAWING & ART SUPPLIES

OPTICAL illusion: Makes drawing simple tracing. Bruce Enterprises, Dept. GE, North Hollywood, Calif.

#### 117 TATTOOING SUPPLIES

TATTOOING Outfits, Supplies, Illustrated List Free. Zeiss, S-484 Lesley, Rockford, Illinois.

#### 120 CANDY MAKING

MEN-Women—"Most Everybody Likes Candy". Learn to manufacture in a professional manner at home. (Our 38th year.) Ragsdale Candies, East Orange, N. J.

#### 125 WOODS

CHRISTMAS cards of real wood. Write Cards of Wood, Manlius 2, N. Y.

#### 129 MAGNETS

ALNICO magnets—Seven assorted \$1.00! Ronald Eyrich, Box 849, Milwaukee 1.

ALL Types—Write for free catalog. Engineered Products Company, Sandusky, Ohio.

ALNICO magnets. Free list. Terry Sales Company, 3726 South Detroit Av., Toledo 9, Ohio.

#### 131 TREASURE FINDERS

METAL Detectors. The Very Latest Circuit. Free Literature. Hedden Metal Detectors, 3329 Liberty St., Pittsburgh 1, Pa.

TREASURE Hunters! Radically new Goldak locators. New featherweight Model 101 weighs only 11 pounds! Revolutionizes location of Gold, Silver and Minerals. Money-back guaranteed superior any other. Write The Goldak Co., 1544 W. Glenoaks, Glendale 1, Calif.

M-SCOPE Metal Locator fully guaranteed and unsurpassed in efficiency. New featherweight models. Time payment plan. Free literature. Fisher Research Laboratory, Inc., Palo Alto, Calif.

SEEK Buried treasure; Methods, mysteries, devices explained. Circulars free. Century Press, Box 151-D, Glen Ellyn, Ill.

MAKE your own treasure locator in fifteen minutes. Cost \$5.00. Complete instructions \$2.00. Osborne, Box 388, Iraan, Texas.

#### 137 DETECTIVES

DETECTIVE Training, Phillips Secret Service, 1917C, N. Kenneth, Chicago 39, Ill.

DETECTIVES—Work home—Travel, Experience unnecessary. Write Wagoner P-125 West 86th, N. Y., N. Y.

INVESTIGATORS—Wanted, throughout the country, to help us gather information. Trace missing persons. Good pay. Bonded Detectives, Inc., Omaha, Nebraska.

MAILING lists! Wide coverage. Bulletin free. Donner, Box 643, Ann Arbor, Mich.

#### 139 MONUMENTS

WRITE for direct low prices. Freight paid. Guaranteed. Free catalog. Granite-Marble Factory A50, Oneco, Fla.

#### 142 INFORMATION

COMPLETE works of Shakespeare. Hamlet, MacBeth, 25 others. \$1.00 brings details. C. A. Gray, Inc., 418 Broad St., Syracuse 10, N. Y.

#### 143 NAME LISTS

MAILING lists; most classes, 1000 \$5.00. Free Prospectus. Dixie Service, King, N. C.

300 CERTIFIED Opportunity Seekers \$1.00. Trable, 1018 1/2 B Elm, Dallas, Texas.

#### 144 MILITARY INSIGNIA

FREE—3 Military Emblems, with Catalog 10c. Hobbyguld, X35 West 32, N. Y.

## USE THIS ORDER FORM TO INCREASE YOUR MAIL ORDER BUSINESS

### LOOK AT THESE LOW RATES

**70c**

Per Word, Per Insertion  
WHITE SPACE—\$4.00 Per Line.  
Minimum Ad—10 Words—\$7.00  
**CASH WITH ORDER**

If You Sell A Product or Service To Men, Use This Easy Means To Get More Sales

### CLASSIFIED ADVERTISING ORDER

Popular Science Monthly • 353 Fourth Avenue • New York

Please insert the ad below in your.....issue.

Heading.....

Enclosed is \$..... Word Count.....

.....  
.....  
.....

EACH WORD IN NAME AND ADDRESS MUST BE COUNTED AS A WORD

Name.....

Address.....City & State.....

To be inserted in the September issue, this order must reach us by July 30th



# \$9.95 TAKES ALL THREE BIG BARGAINS

**1. AUDIO AMPLIFIER.** Undreamed of value. Uses 6V6's. Has 4 microphone inputs brought to jacks at rear panel. Various output impedances available at rear panel connections. Steel case with chrome handles. 9" long x 9" high x 6" deep. Tubes included. New in original carton. Shipping weight 15 lb. **SUPER SPECIAL—\$4.95** while supply lasts.

**2. RADIO HEADSETS.** Latest supersensitive type with rubber earpieces. Every pair guaranteed perfect. \$5.99 per pair OR 3 PAIRS FOR \$1.00.

**3. HOME WORKSHOP AT BARGAIN PRICE.** Accurate and precise 2 speed guaranteed hobby lathe, the essential machine for the home workshop. Sturdy enough for light production work or factory standby service. Supplied with 56" of belting for connecting to any available electric motor or power take-off, such as on a jeep or tractor. Also included in this unbelievable offer are such accessories as a 1½" drill chuck with specially hardened tool steel jaws, a 4" electric furnace high speed grinding wheel, a cotton buffing wheel with a large supply of buffing compound, and a 4" steel wire scratch brush. Your cost \$6.00. Sole export agent. Distributor inquiries invited.

**ORDER NOW—DON'T DELAY—NO C.O.D.s**  
**BUFFALO RADIO SUPPLY** Dept. 4M  
219 Genesee St.  
Buffalo 3, N. Y.

## RELEASE the Full Power of YOUR MIND

Send for free booklet telling how you can achieve success and reach your personal goals. Find out how to remove frustrations and inferior feelings. Learn how to make your subconscious mind work for, not against, you. Write today. No obligation.

Broadwell Studio Schools, Dept. 8G Covina, California  
Established 22 Years

## HOW TO BUILD 78 RADIOS!

Giant book, *Radio For The Millions* tells you how to build 78 radios—an 8-tube FM set, a 2-way radio station, bicycle radio, vest pocket portable, floor lamp set, all-wave receiver, home recorder, etc. 192 pages, 648 pictures! Order today! When book arrives, pay postman only \$1.49 plus postage for handsome cloth bound, Regular edition. If after 7 days' free trial you aren't delighted, return it for full refund. Write for it today, to:—

POPULAR SCIENCE, Dept. 78, 353 4th Ave., N. Y. 10, N. Y.

Say You Saw  
It In Popular Science

## It's Now Available... the latest BOOK ON REFRIGERATION!

The **REFRIGERATION SERVICEMAN'S MANUAL** by Magnus & Marlott is the last word on repair methods and servicing. It contains all the detailed basic information necessary to maintain, service, and repair electrical and absorption refrigerators. Instructions on how to develop the mechanical skills required are set forth in easy step-by-step procedure. Should be in every serviceman's kit. 704 pages—Limp, durable binding—stamped in genuine gold. **\$5.00**

Send in your order today! Mailed Prepaid if cash is sent with order. If C.O.D. Postage and C.O.D. charges added. Schools are invited to write for special prices.

**WILCOX & FOLLETT CO.** 1255 S. Wabash Ave.  
Dept. 4871 - Chicago 5, Ill.



**NOW! BUILD 15 RADIOS \$14.75**  
COMPLETE KIT ONLY...

**Absolutely no Knowledge  
of Radio Necessary**

**You Need NO Additional Parts**

**THE PROGRESSIVE RADIO KIT** is THE ONLY COMPLETE KIT. Contains everything you need. Instruction Book, Metal Chassis, Tubes, Condensers, Resistors and all Radio parts. The 36-Page Book written by Expert Radio Instructors teaches you to build radios in a Professional Manner. You start with a 1-tube receiver. Before you are done with this kit, you will have built 11 Receivers, 1 Public Address System and 3 Transmitters.

### SPECIAL FREE OFFER!

Electrical and Radio Tester sent absolutely FREE with each Progressive Radio Kit. PLUS FREE membership in Progressive Radio Club. Entitles you to free expert advice and consultation service with licensed radio technicians.

Write for further information, or **ORDER \$14.75** your KIT NOW! ONLY.....

### BUILD A 5 TUBE AMPLIFIER—only \$5.95

Ideal for phonograph, FM tuner or microphone. Has 5 tubes including rectifier. Kit is complete with tubes, chassis, volume control, tone control, radio parts, hook-up wire, solder and instructions. We can provide a 4-inch PM speaker with mounted output transformer to fit on chassis, priced at \$1.95. Or use this kit with your own speaker. It has 5 watts output, more than enough to drive a 12-inch speaker.

Postage prepaid with check or money order.

(Postage not prepaid with C.O.D. orders)

**PROGRESSIVE ELECTRONICS CO., Dept. 98**

497 Union Avenue

Brooklyn 11, N. Y.

## HOW TO SAVE MONEY ON Home Repairs!



**Only \$1.49**

crammed into one big cloth-bound volume to sell for only \$1.49. Books of similar size usually sell for \$2.50 or more!

### SEND NO MONEY NOW!

Just mail coupon below and pay postman only \$1.49 plus mailing cost for this DeLuxe edition. If, after 10 days' examination, you wish to return book for any reason, we will gladly refund every cent you paid.

POPULAR SCIENCE—Dept. 78, 353 Fourth Avenue, New York 10, N. Y.

Send me the new 260-page cloth-bound book, **TINKERING WITH TOOLS**. I will pay postman only \$1.49, plus few cents postage, on delivery. If dissatisfied, I may return book within 10 days for full refund.

NAME.....

ADDRESS.....

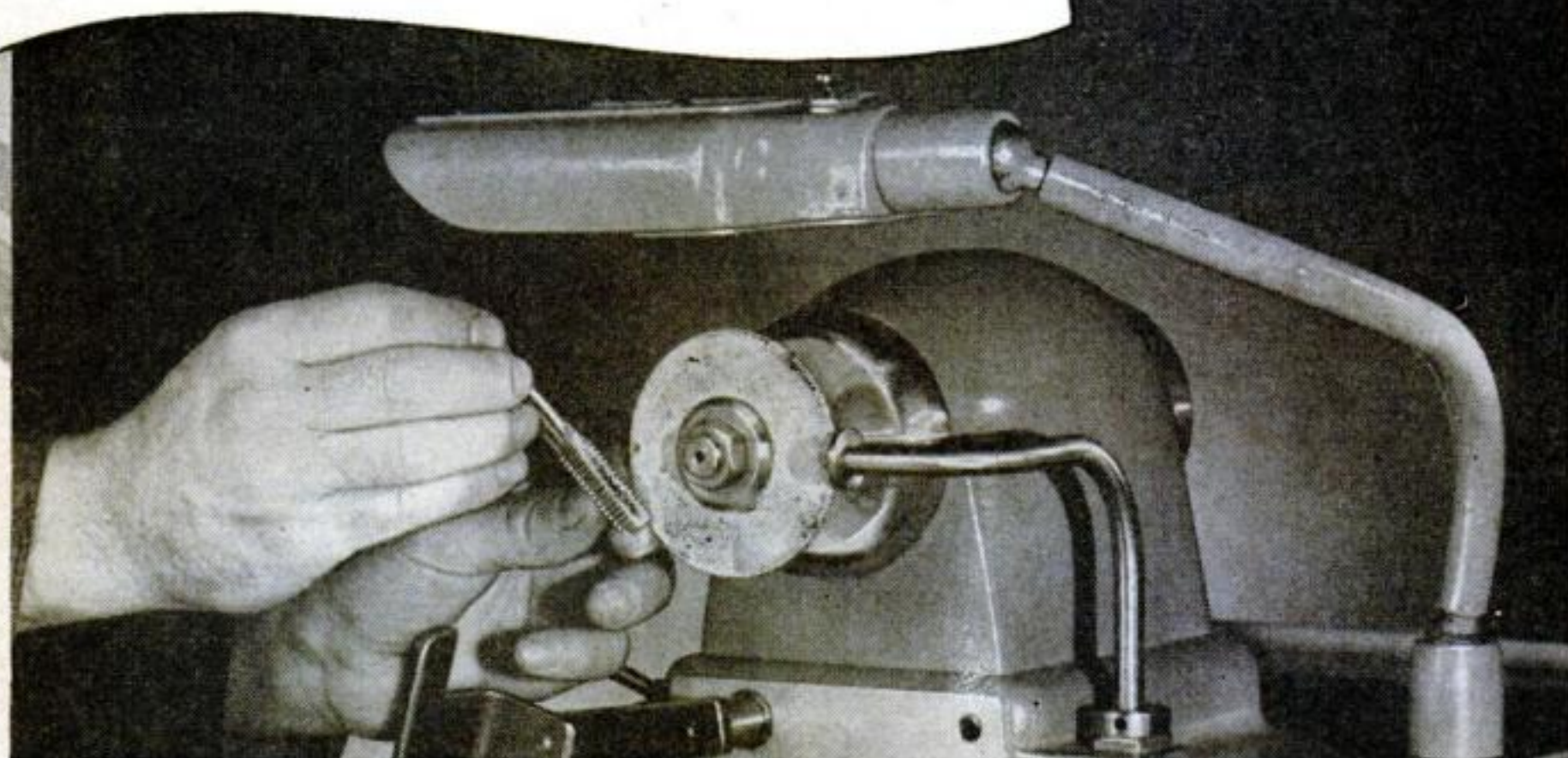
CITY.....STATE.....

(If you prefer to remit now, we pay postage. Same refund guarantee)



# Ingenious New Technical Methods

To Help You  
Simplify Shop Work



## Versatile New Grinder Saves Time —Improves Grinding Efficiency

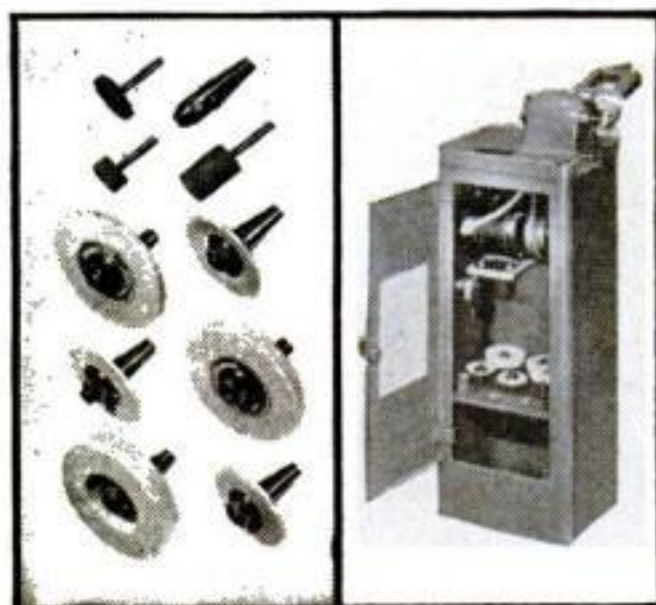
A new grinder, the Corlett-Turner G-3, permits changing of grinding wheels in a matter of seconds and assures a true running wheel at all times. Each wheel is individually mounted on a ground, tapered arbor.

**Easy wheel changing** is accomplished by a slight wrist motion on the end bells of the grinder head. A twist to the left releases the wheel arbor; the reverse action instantly secures it in place. It's all done in a matter of seconds. No costly time is lost in repeated wheel dressing.

**In addition to its primary function**, the G-3 grinder has innumerable uses for burring, buffing, polishing, and production applications requiring a high speed spindle. Powered by a 1/3 horsepower motor, a three-step pulley arrangement provides speeds of 5600, 8000 and 12,000 r.p.m.

**Efficiency in precision work** is also increased when tension is relieved by the act of chewing. And chewing Wrigley's Spearmint is a pleasant, easy way to help relieve workers' nervous tension. For these reasons Wrigley's Spearmint Chewing Gum is being made available more and more by plant owners everywhere.

*Complete details may be obtained from  
Corlett-Turner Co., 1001 S. Kostner Avenue  
Chicago 24, Illinois*



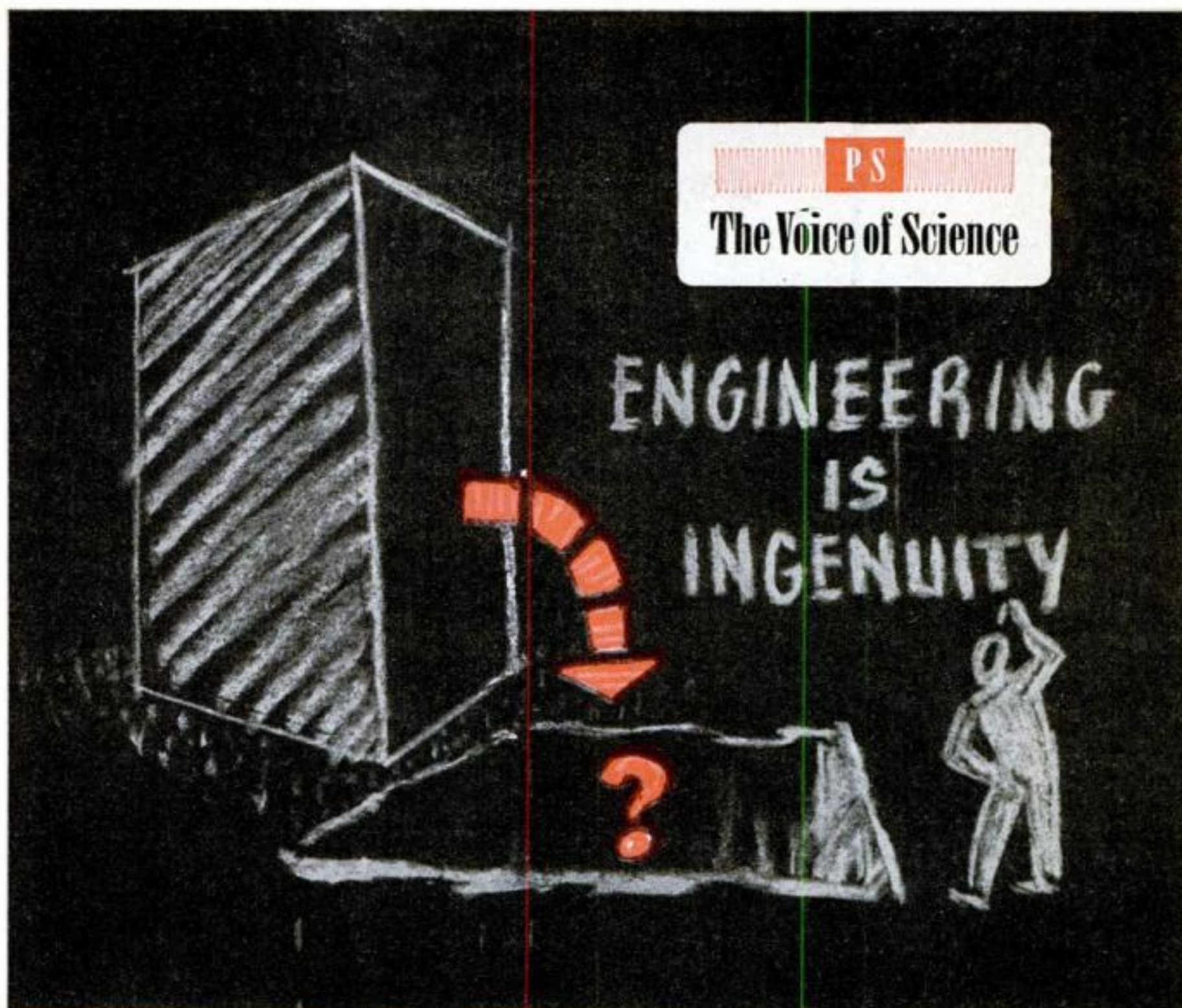
Grinding  
Wheels

Corlett-Turner  
Grinder



AC-69





P S

The Voice of Science

ENGINEERING  
IS  
INGENUITY

A GREAT engineer told me this story a good many years ago. Colonel Hugh Cooper is dead, but there are many monuments to his memory. One of them was the huge Dnieprostroi Dam in Russia. When I talked to him on his return to this country, he was full of anecdotes about Russian workmen who were then beginning to catch up in mechanical ability with the rest of the world. Some of these workers didn't know a monkey from a wrench. But what they lacked in tool know-how, they made up somewhat in native ingenuity.

The old Colonel's story concerned a party of engineers who had prepared a pit to hold a very heavy piece of equipment. The equipment arrived. Then they were stumped. There wasn't a crane for miles that could handle such a weight, or material available for some substitute lash-up.

Then some of the workers, after buzzing among themselves, came forward grinning with a suggestion. If, they said, the problem was to get the big thing gently into

the big hole, they knew how to do it. The engineers worried about positioning the heavy equipment on the bed bolts, but as soon as they heard the idea, they, too, began to grin.

Can you figure out how they did it? It was simple enough.

They simply filled the pit with cakes of ice, skidded the thing into position, sat down to wait for the ice to melt, and pumped out the water as fast as it accumulated.

Colonel Cooper's point was that the engineers ought to have thought of it themselves. They had forgotten that even the words "engineering" and "ingenuity" came from the same Latin source. And that an engineer who gets too far from ingenuity is like a plumber without his tools.

I would like to add that a plumber who has arrived at an ingenious solution of a piping problem is by way of being a good engineer in fact and in spirit.

*Perry Githens*





*Millions of Americans—with RCA television—will see history as it is made at the two National Political Conventions.*

## ***Look before you vote — with Television***

This year, television joins press and radio as a "political reporter," in Philadelphia, at the Republican Convention, June 21, and the Democratic Convention, July 12. As political leaders step up to speak, you're right with them on the platform.

The Candidate will be televised as he looks into the camera—talks to the people, face to face. His appearance, smile, gestures, combine with his voice to complete the transmission of personality. You have a new chance to know your man!

Important as any in history, the 1948 political conventions will be covered from start to finish by keen-eyed RCA Image Orthicon television cameras. Highlights and sidelights, all will be seen. And what the television camera catches will be sharp and clear on the screens of RCA Victor home television receivers...

Today, 40,000,000 Americans are within easy reach of daily television programs.

Television as an aid to good

citizenship, through the formation of an enlightened public opinion, is only one way in which developments from RCA Laboratories serve the Nation and its people. Advanced research is part of any instrument bearing the name RCA or RCA Victor.

When in Radio City, New York, be sure to see the radio, television and electronic wonders at RCA Exhibition Hall, 36 West 49th Street. Free admission. Radio Corporation of America, RCA Building, Radio City, N. Y. 20.



**RADIO CORPORATION of AMERICA**

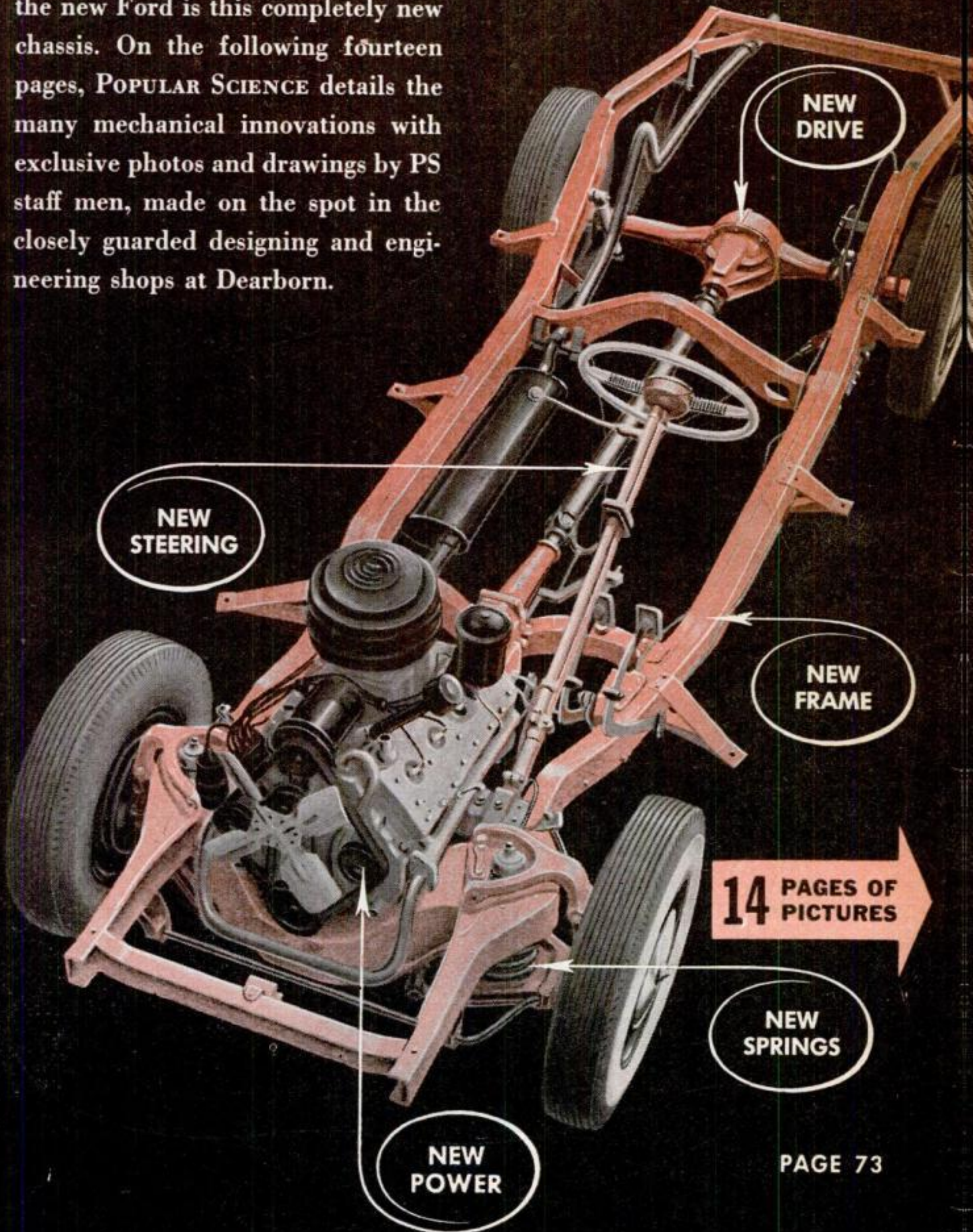


JULY 1948

Popular Science

# Under the Hood...

Behind the advanced body styling of the new Ford is this completely new chassis. On the following fourteen pages, POPULAR SCIENCE details the many mechanical innovations with exclusive photos and drawings by PS staff men, made on the spot in the closely guarded designing and engineering shops at Dearborn.

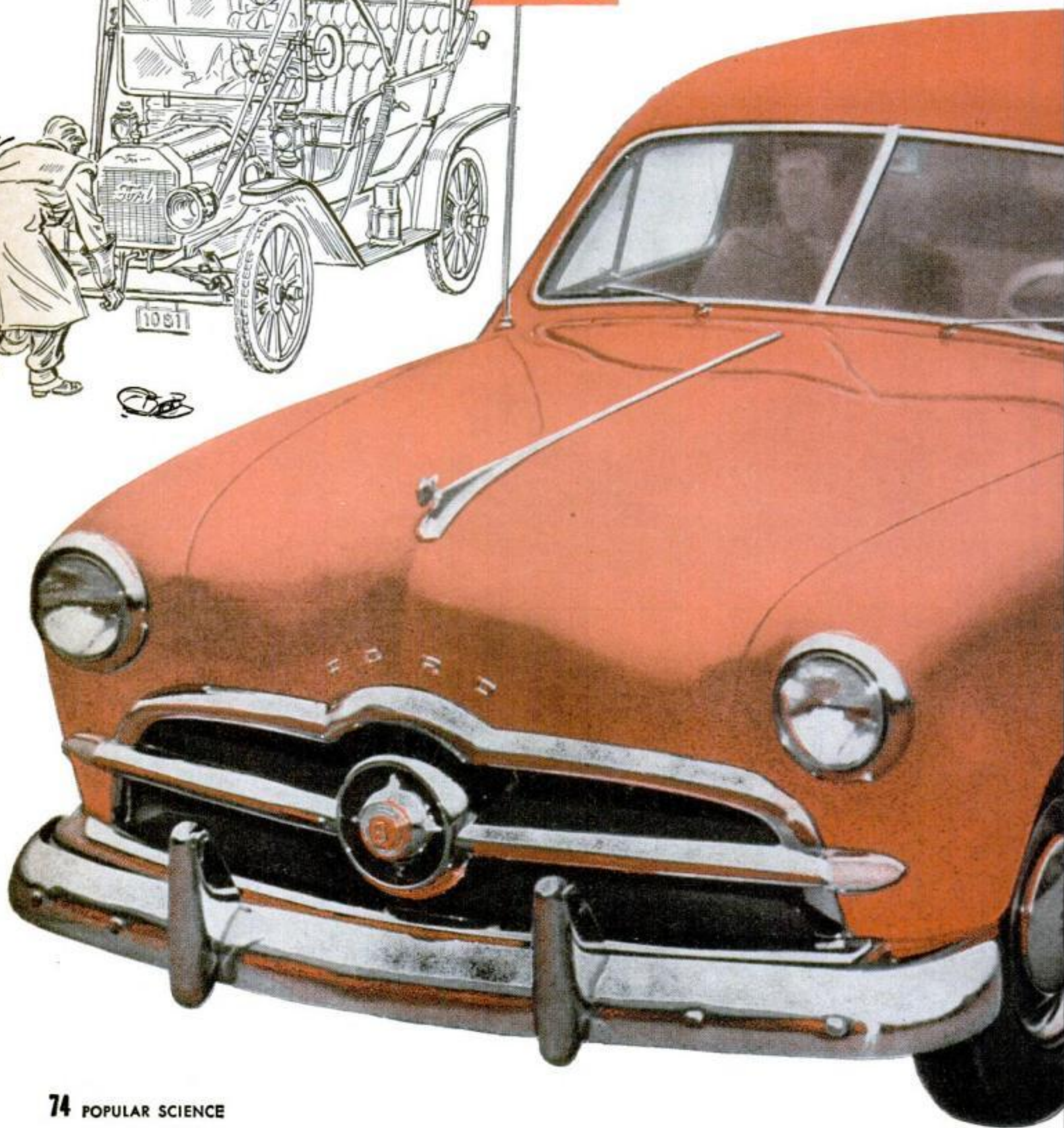
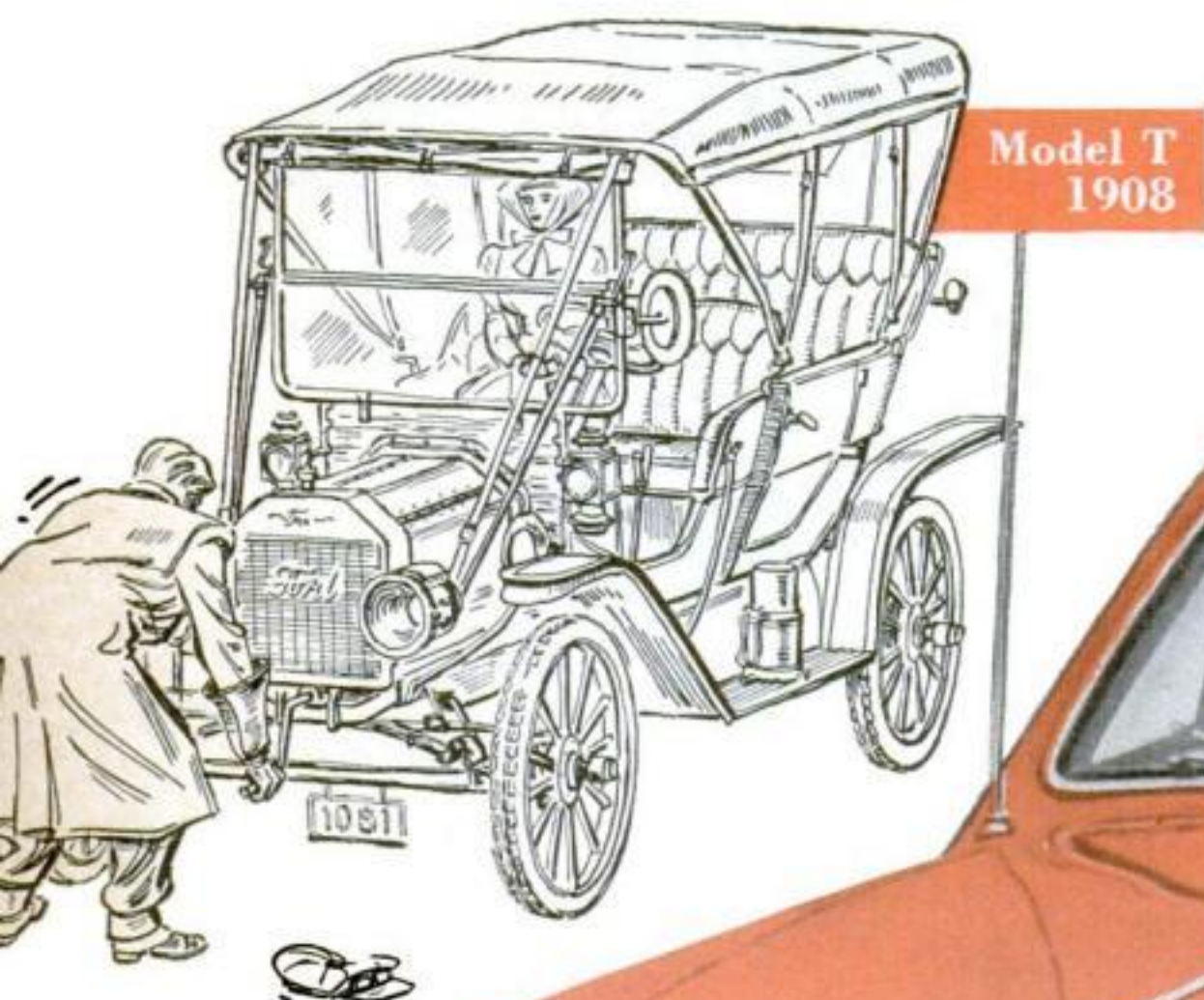


PAGE 73

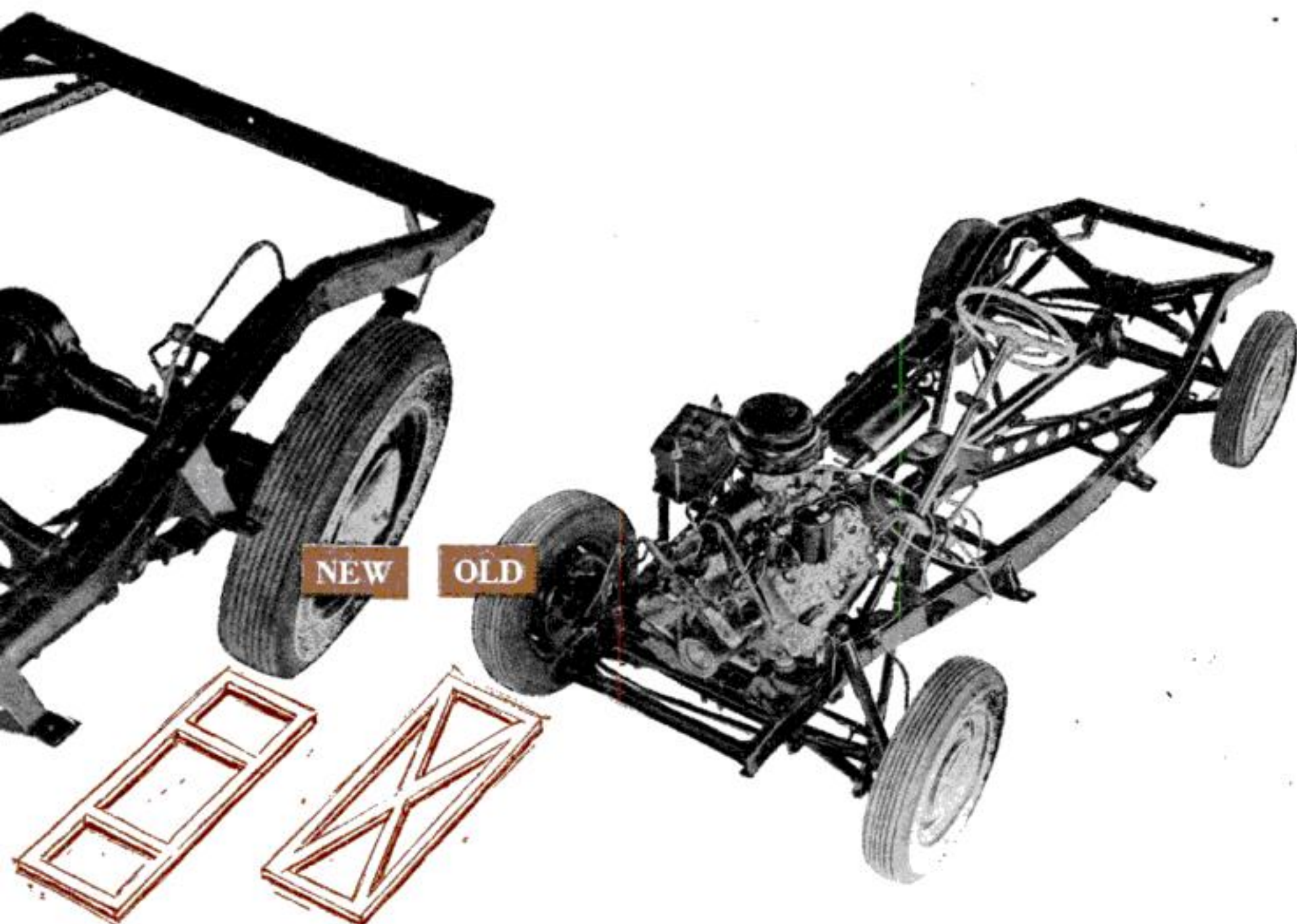


# The Inside Story

**POPULAR SCIENCE** tells







**Frame in all models** except station wagon and convertible is built-up, box-section ladder type with 5 cross-members. Elimination of old X member (right) reduced weight, permitted lowering body. Station wagon is of one-piece all-steel construction, for safety, with plywood veneer exterior. Sedan body is attached to frame at 22 points. Repairs and servicing are easier because of good accessibility. Oil-filter neck on engine has been moved forward and distributor brought from lower front center to above head on right cylinder bank. Instead of

being directly connected to camshaft, it's gear driven. Solid valve guides reduce oil leakage. Exhaust yoke ends need to remove *two* tailpipes to "pull" an engine. Optional thermostatic fan on electric clutch slips until engine reaches 140° F. This helps warmup, boosts gas mileage. Braking problem caused by new weight distribution was solved by putting 62.3 percent of braking power in front wheels and 37.7 in rear. This matches a weight distribution on deceleration at 70 m.p.h. of 59.5 percent in front and 40.5 percent in the rear.

The new Ford is a Ford in name only. The company intended it to be just that when, in September 1946, the engineers and stylists were told to start doodling on a new car with their compasses and T squares. The car-to-be already had a name. It was known as X-2,900. The X was for Experimental, and the 2,900 was the number of pounds of weight Ford was shooting at. If the weight could be shaved to 2,900, it would be a saving of 500 pounds under the current model.

Less weight would mean lower manufacturing cost and more miles per gallon for the owner.

Time was important. Competitors would be on the market.

First of all, Ford took apart the competing cars. What did they have that the Ford didn't have? The Ford people had to admit that the answer was plenty. Three study

chassis were ordered built. Possible body lines were chalked in, but the bodies could come later. Right now the chassis layout was the most important thing.

Right off, Ford decided that the 1949 body would have to be moved several inches forward. Already the men in charge of the project were thinking in terms of a "mid-ship" ride for both the front and rear seat passengers. That would supply more luggage room too. But to move the body forward meant moving the engine too.

"You're going to get all that extra weight on the front wheels," warned the conservatives in the company.

"Yes," they were told, "we know. Let's take one thing at a time. We'll come to that."

The roof would be lowered. But how? You had to have frame depth for strength. You had to have road clearance. You had to have headroom. What were you going to



do with the propeller shaft to the rear axle—let the passengers straddle it? If you lowered the engine, it would squash right down on the steering linkage.

One thing at a time, counseled the men with a mind's-eye picture of the new Ford. Change the steering linkage. Change the frame. Change the brakes.

By November the study chassis were done. Gone was the familiar X stiffener in the frame. Gone were yesteryear's radius rods. Gone was the torque-tube drive. The engine had been shoved a full five inches forward over a brand new kind of steering linkage with a new "geometry."

Structural studies were made in the laboratory. They put excess weights and stresses on the hand-built chassis until it shattered. Everybody nodded. The frames were even stronger than the old ones. They hung 1947 bodies on the new frames and put them on the oval test track, screened from public view by a high board fence and a continuous thicket of evergreens.

The hybrids drove well. With a lower center of gravity, they were leechlike on the road. The new steering linkage eliminated any tendency toward "wind-wandering." The cars "cornered" well on turns. There was a lot of brake trouble on account of the new weight distribution, but that could be whipped. Some of the hybrids were put on the open road. They behaved well.

### *Next Problem: Body Appeal*

But what about bodies? There was a problem. A mistake in styling could ruin the project. The public won't buy something it doesn't like the looks of.

They made up some seating bucks (PS, Nov. '46, pp. 66-72), with roughed-in windshields and fenders. There was lots of interior room. That was the way it would have to be. By December the acceptable body styles had been reduced to two and the full-size clay models had been built up.

"No Ford in those," remarked one company official, grinning.

In the design finally chosen, by vote, body width had been pushed clear to the outer edges of the vestigial running boards. A "bustle back" made even the 4-door-sedan model look as natty as a coupe. There was leg room fore and aft. From the front of the

hood to the tips of the tail lights, the lines, were poetry in motion.

It was not until the latter part of July, 1947, that the first of the hand-built, complete 1949 Fords were put on the test track. The new cars, deliberately smeared with mud, streaked with stove blacking, and with all means of identification removed, were put on the highway.

Onlookers got curious. On one occasion a new Ford was caught in standstill traffic. Neighboring drivers slid from under their wheels and sauntered over to take a close look at it.

"Maybe it's a Studebaker," ventured one, "but I don't know." His brow puckered. "Is it a Studebaker?" he asked the Ford driver.

"Yes," replied the Ford man.

Recognition was not the only risk that Ford ran in testing its '49s. On the track some of the drivers, with their hands on a vehicle that accelerated like a jack rabbit and rolled like a hurricane, had to play cowboy. Bodies were dented. The engineering department raised Cain. New Fords were few, and there was work to be done.

### *Designed in Record Time*

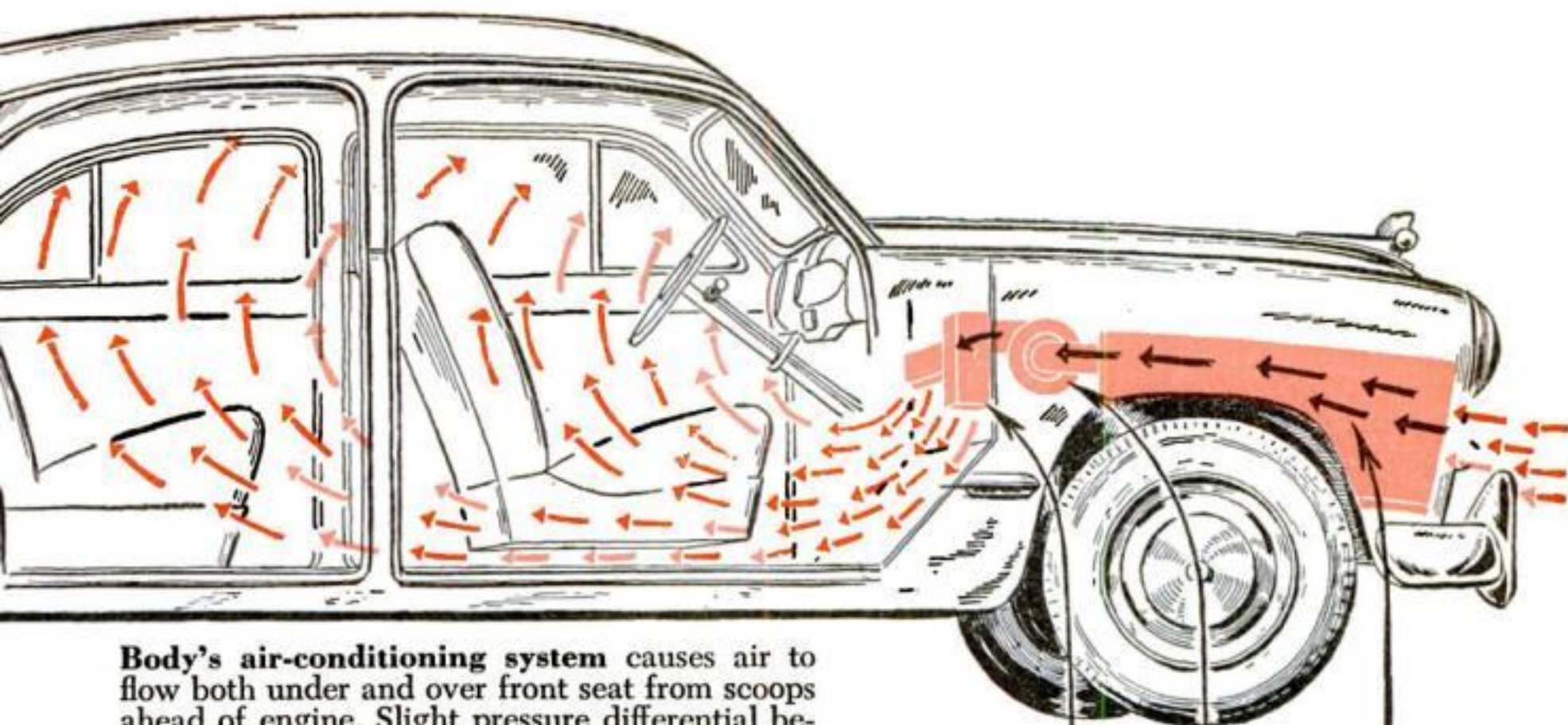
It was just 14 months after draftsmen began drawing pictures on paper that Ford was substantially satisfied with its new car. That was a record. Usually it takes two to two and a half years to produce the pilot models of a brand new car.

Ford had missed its mark on weight. The car was not 500 pounds lighter. That was because there wasn't the time to re-do the engine completely. But, at that, the weight of the '49 Ford was considerably beyond 200 pounds under current models.

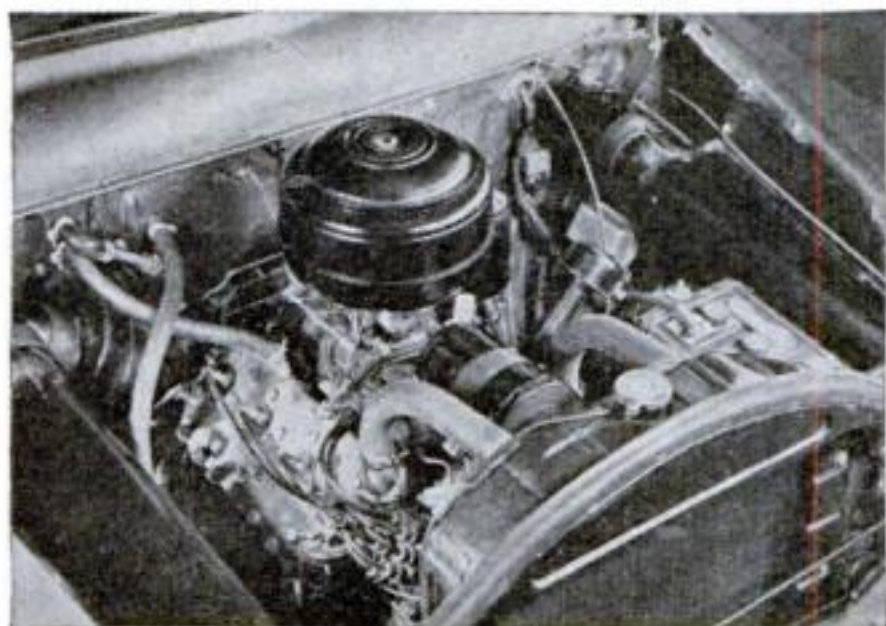
Even while the Rouge plant, amid the heat of its blast furnaces and the clanging of its drop hammers, was tooling up last spring for the manufacture of '49 Fords, the engineering department was still making last-minute changes. A car that had cost many millions to develop had to be as perfect as human resource could make it. Tooling was expensive too. That was costing \$37,500,000.

The man who sparked the development of the new car bears the same name as the man who built the first Ford. Henry Ford II, grandson of the inventor who in the formative years of the century did more than any other manufacturer to put America on wheels, is young. He won't be 31 until September. In the backwaters of the Rouge





**Body's air-conditioning system** causes air to flow both under and over front seat from scoops ahead of engine. Slight pressure differential between inside and outside air built up by ram effect when car is under way keeps the windows from frosting during cold weather.



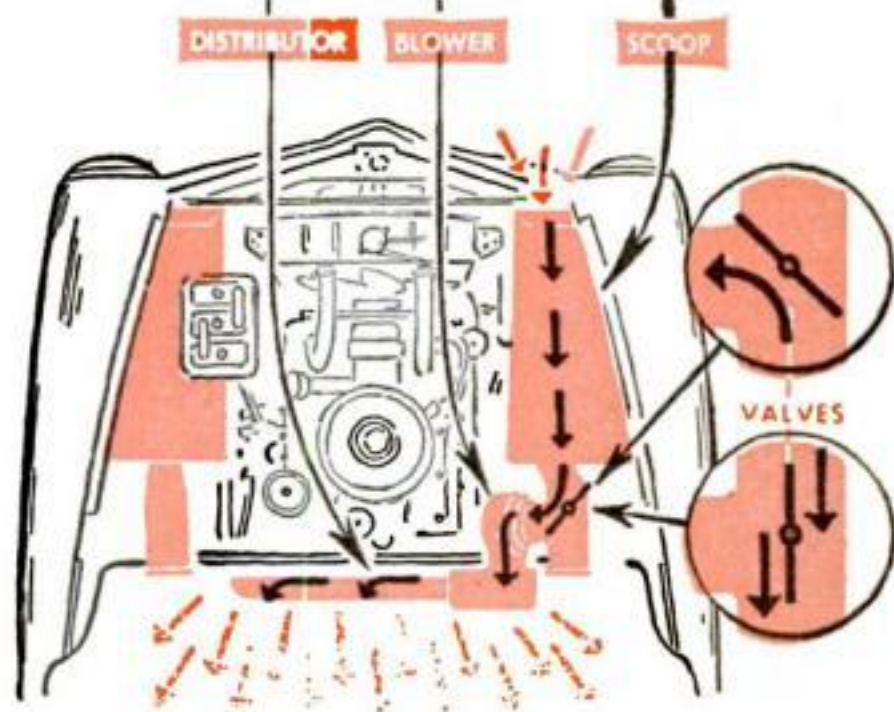
**Position of scoops** assures fume-free air. Three-way valve at blower directs air passage straight into car body, through blower to heater, or shuts off air from intake and permits body-interior air to be recirculated through blower and heater for reconditioning.

he is known as "H.F. 2" or "The Deuce." The terms are not derisive. Young Henry has shown marked administrative abilities and a willingness to turn his back on tradition.

The story goes that soon after he assumed the presidency of Ford in 1945, he walked along the assembly line slamming the doors of his cars. They were just as strong, just as well hung, as those of his competitors' cars, but their acoustics were bad. They sounded tinny.

"That," remarked young Henry, "has got to be changed."

It has been. Many other things have been changed too. The first great revolution at Ford was the switch from the Model T to



**There are actually two air systems.** Left one provides fresh air only and is controlled by manually operated outlet. Right one can supply fresh air too, but also can be manipulated to divert air to blower and heater as described at left. System eliminates old cowl ventilator.

the Model A in 1928. The second was the V-8 in 1932. As architect of the third, young Henry has outdone his grandfather.

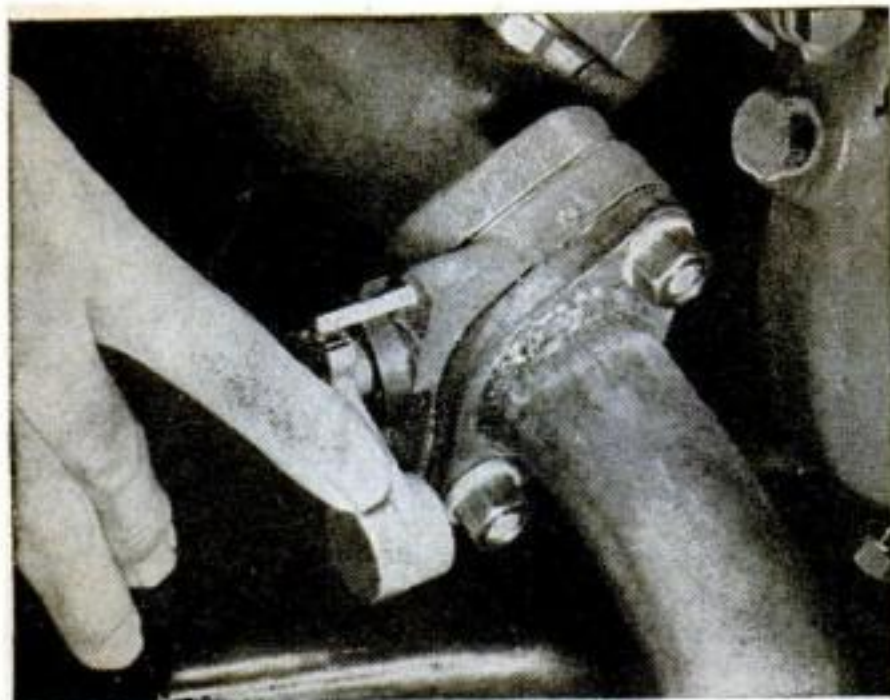
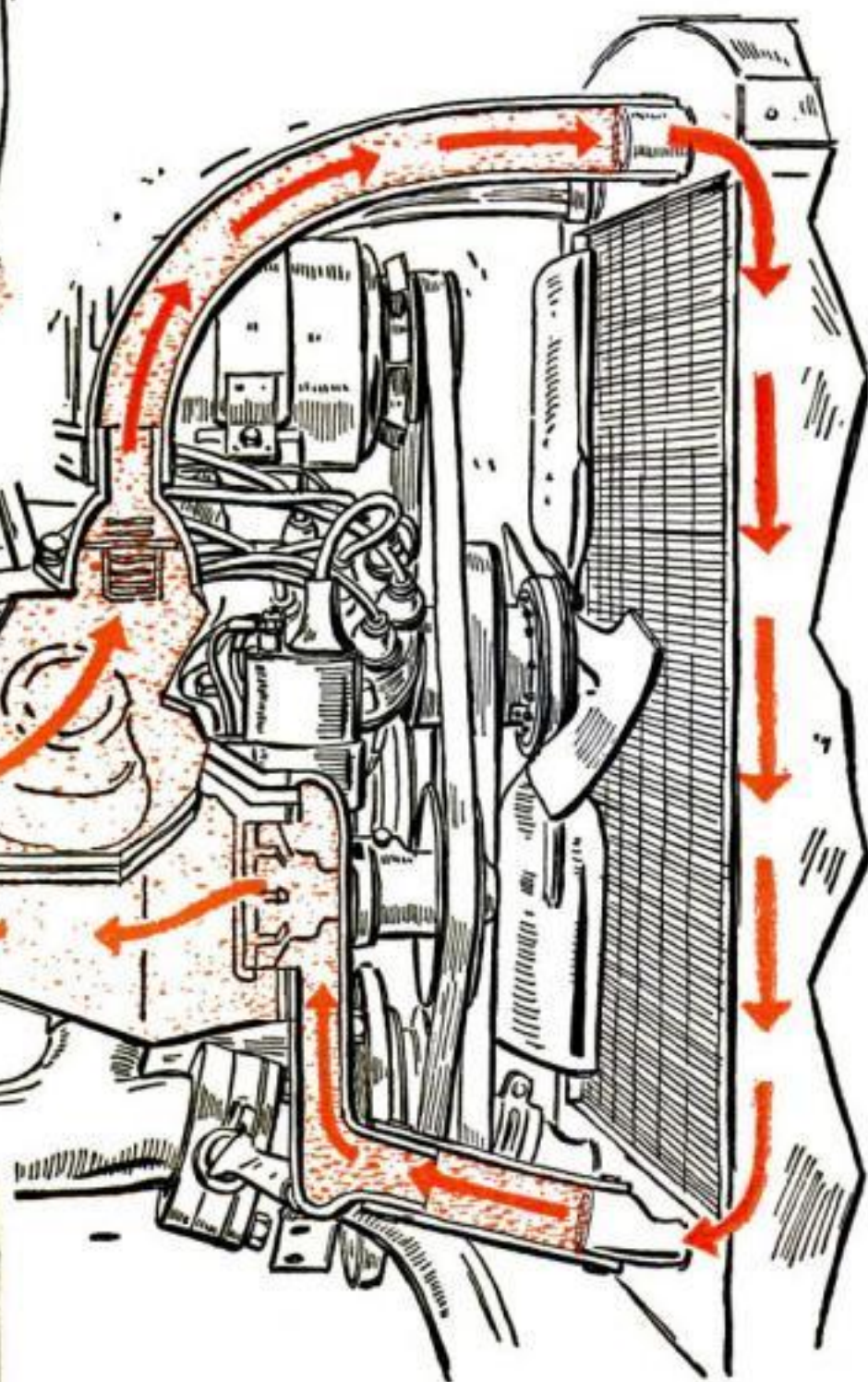
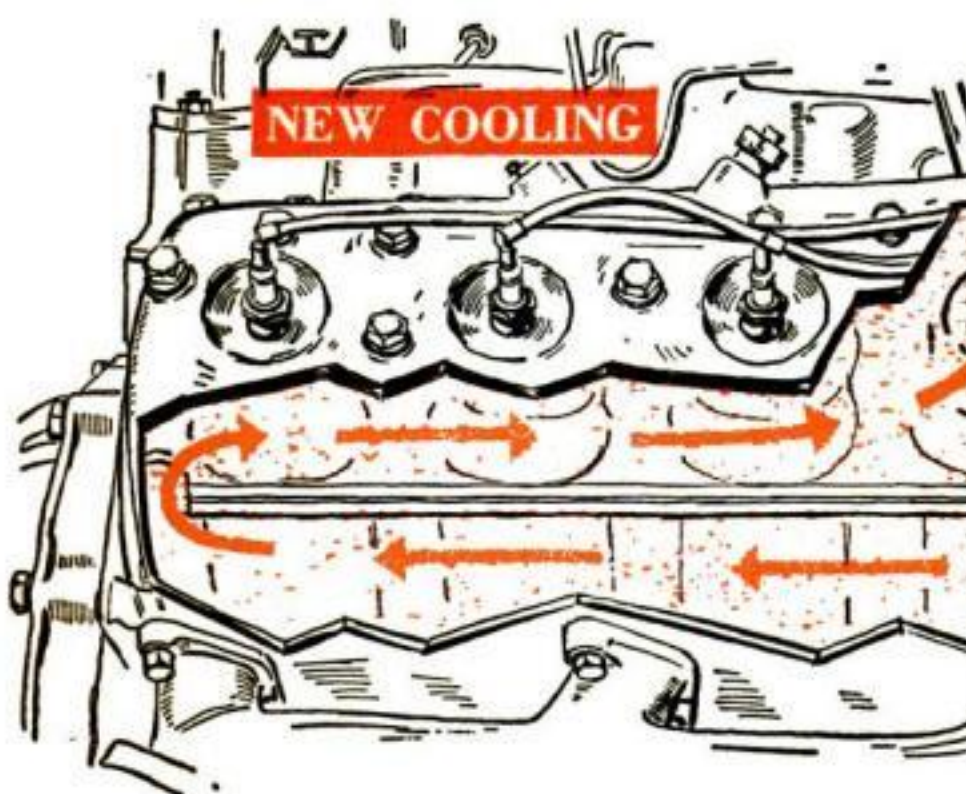
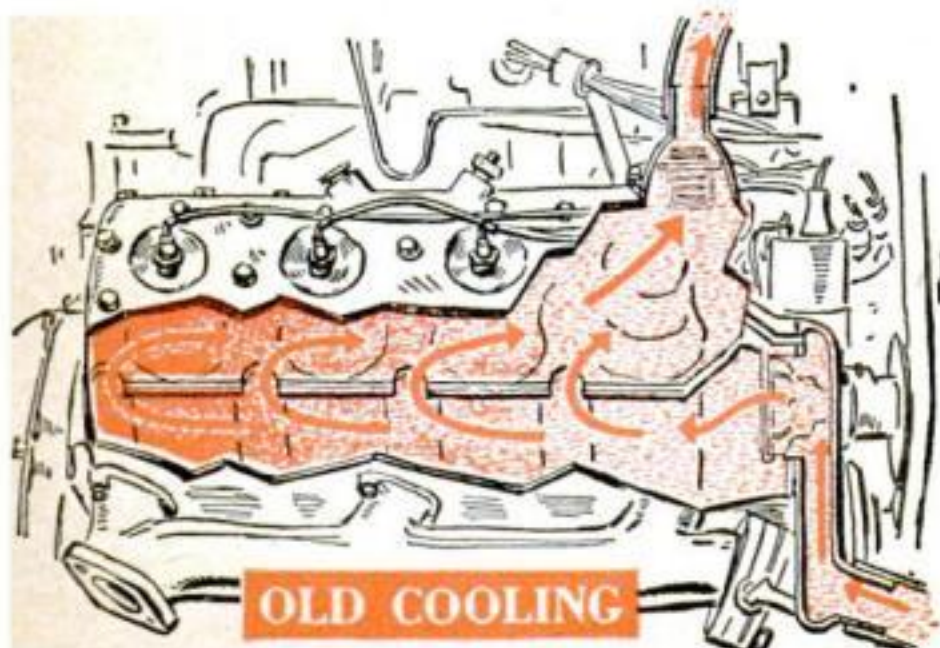
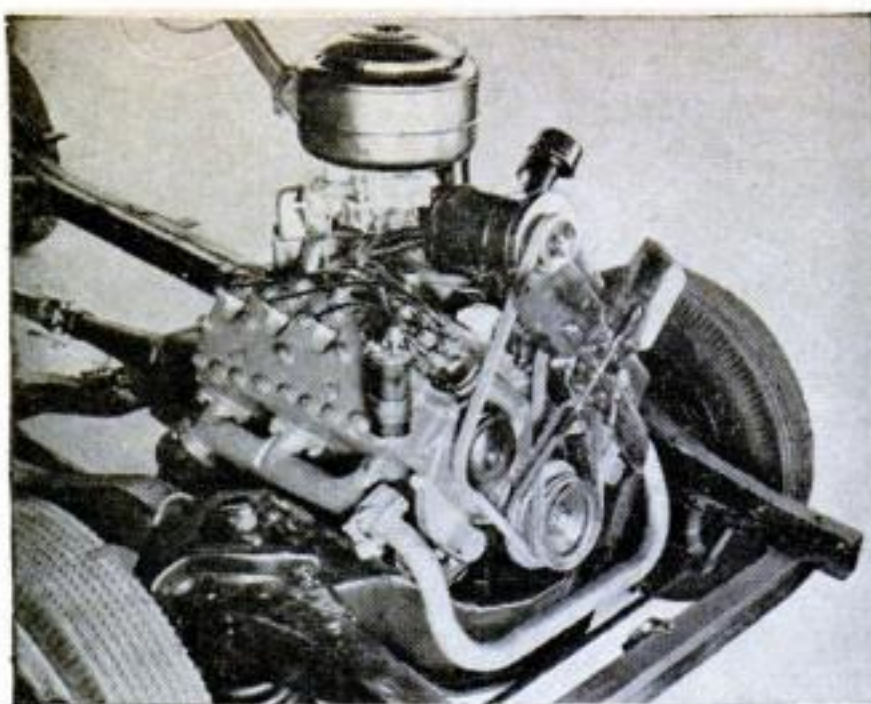
Yet, when I slipped behind the wheel of the new Ford for the first time I felt somewhat sad. I had driven a Ford for the first time in 1917. My memories of it were tender. That old planetary gear system and the front wheels that always wanted to wander off the road had something that no amount of brilliant engineering in this day could supplant. This break with tradition was too sharp.

Then I pushed the starter button. The familiar Ford starter whine smote my ears. Somehow I felt a lot better.



**New Ford engine**

**eliminates an  
old cooling bugaboo.**



**Thermostatic valve** behind exhaust yoke on right side reroutes gases through passages around intake manifold to speed warmup.

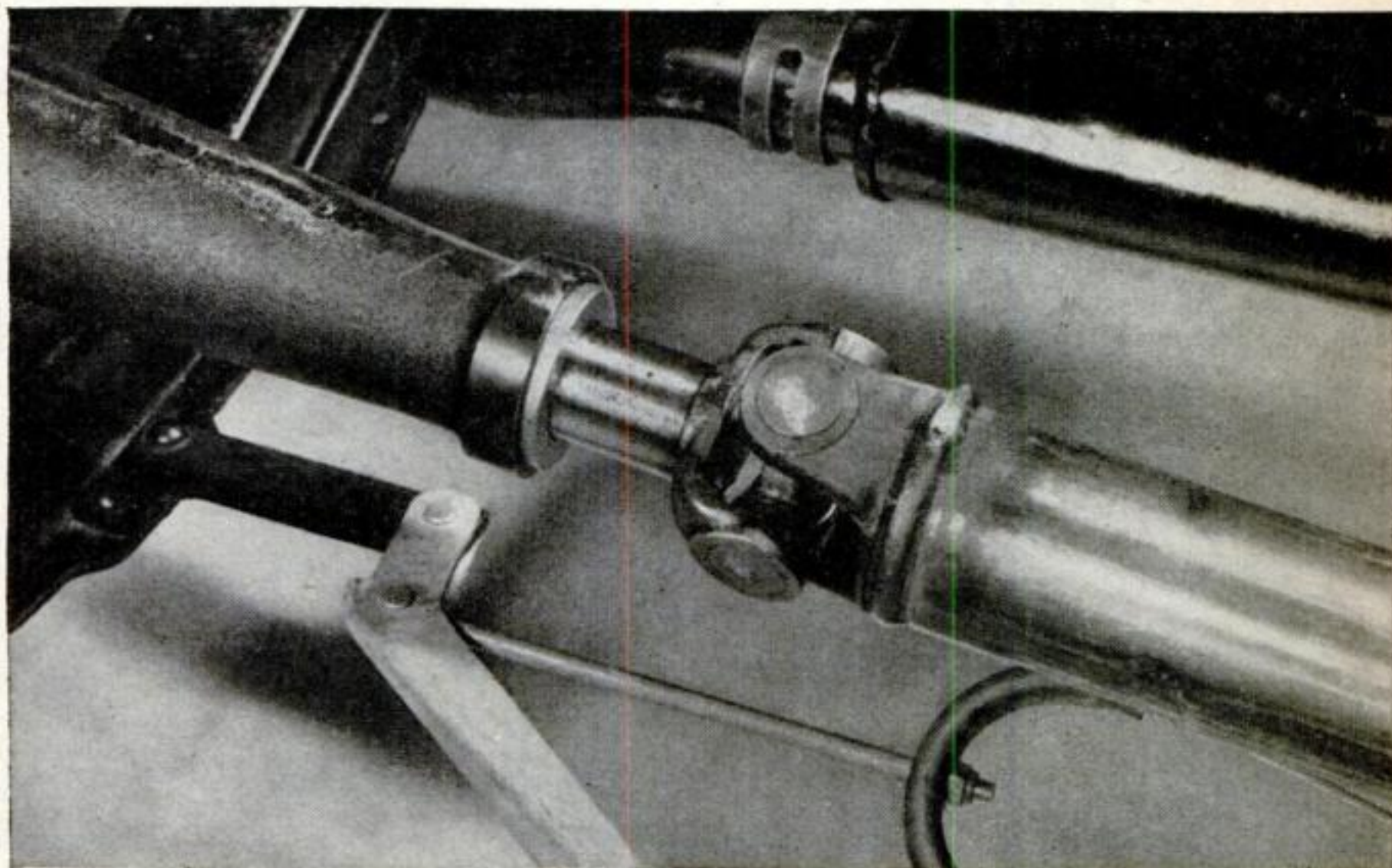
**New cooling system** lowers running temperature by 12°. Cool water is pumped straight to rear of block, up to cylinder head, and back to radiator. Equalizing cooling from end to end reduces temperature differential between front and rear of engine to 4°, controlling hot spots. Heat dissipation is speeded also by the cooling system's highly turbulent water flow. New Ford comes with either V-8 or 6-cylinder in-line engine. V-8 is rated at 100 hp. at 3,800 r.p.m., the 6 at 95 hp. at 3,300 r.p.m. Compression ratio of each is boosted to 6.8 to 1. Bore and stroke of the V-8 are 3 3/16 and 3 1/4 in.; those of the 6-cylinder engine, 3.3 and 4.4 in.





Ford has "bob-tailed" engine by casting block separately from clutch housing. Behind clutch is transmission, held by only four bolts, and 16-inch transmission extension used to shorten propeller shaft and make room to lower body floor. Intake and exhaust noises are reduced by redesign of air cleaner, manifold, and muffler system. Distributor control for spark-advance regulation is operated by vacuum only, instead of by old dual system of vacuum and centrifugal

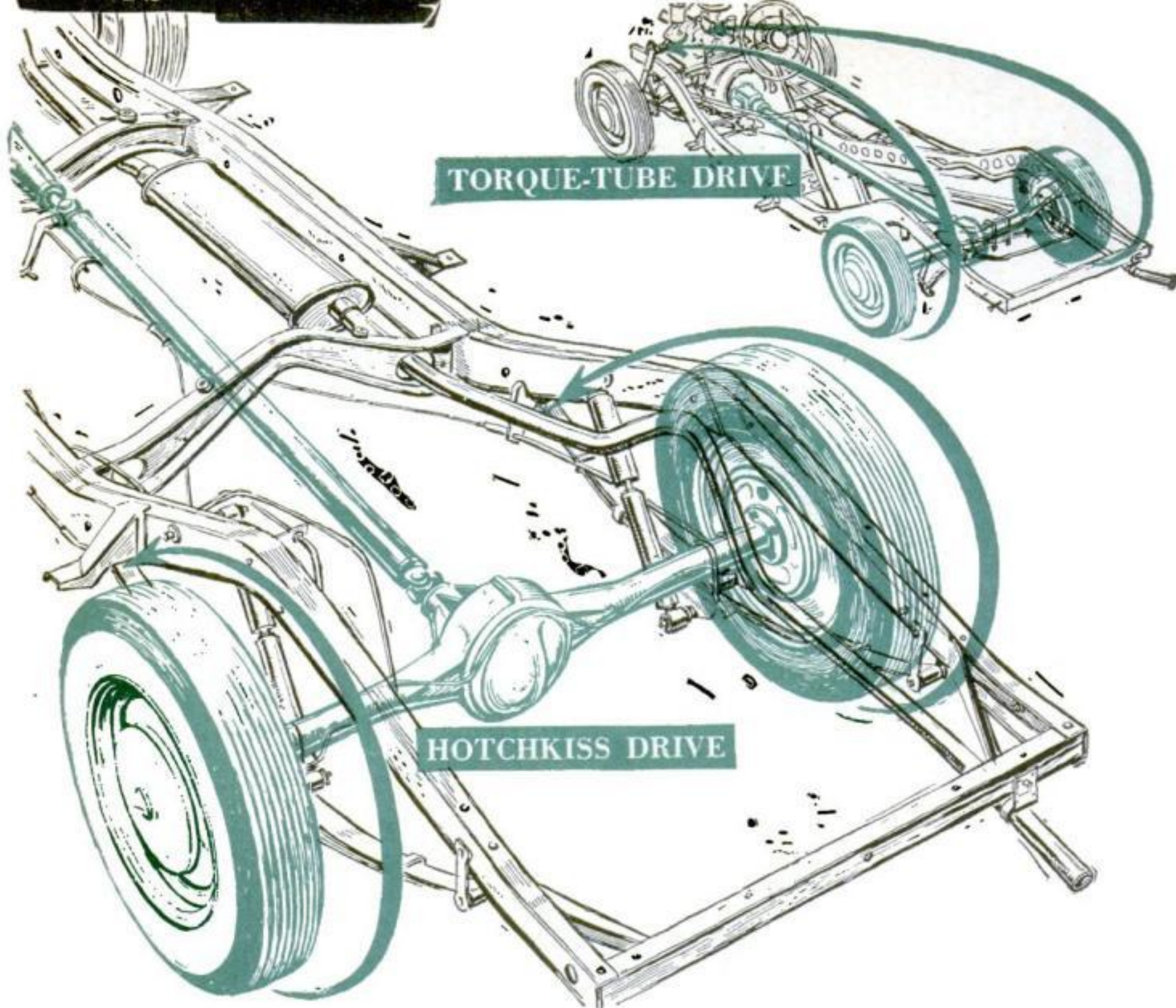
force. This eliminates governor and plunger in distributor. Opening in clutch housing, with timing marks on flywheel and housing, permits more accurate timing. Engine oil pan, clutch, and transmission can now be taken out without removing engine. Transmission extension can be replaced with an optional overdrive with 2.87 ratio. Its use cuts engine wear considerably and increases gas mileage. The overdrive engages when the car is traveling at 26 m.p.h.



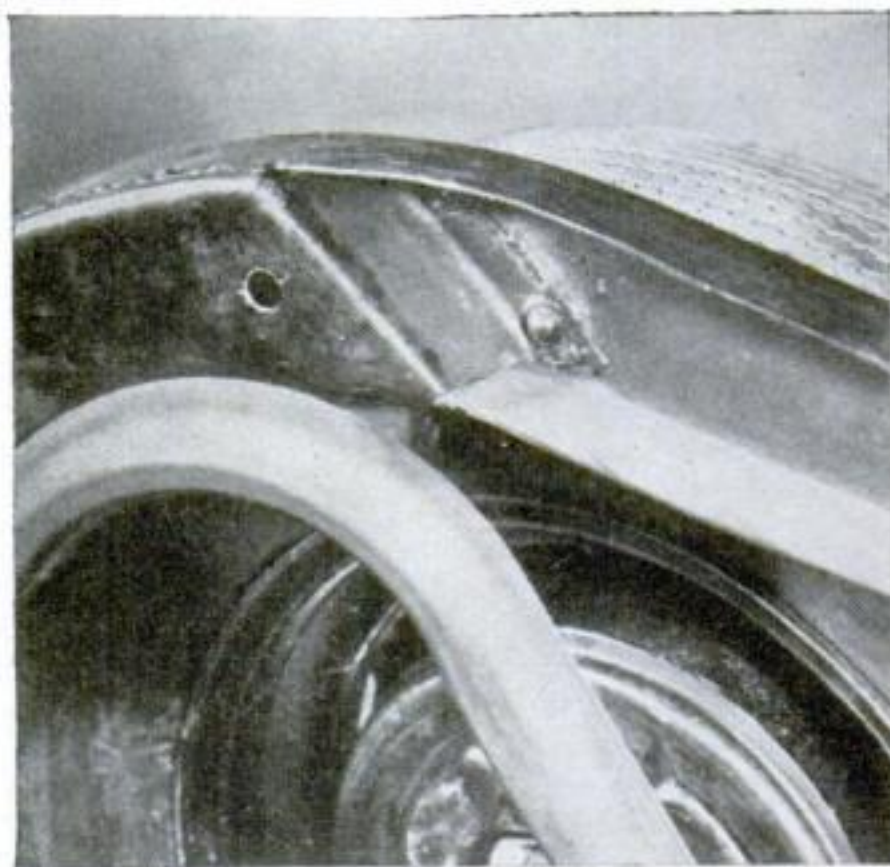
Front of Hotchkiss drive shows one of two universal joints and shaft that is free to slide in and out of transmission extension as rear

axle takes road shocks. New system reduces weight, permits lower frame height, gives greater riding comfort, and reduces clutch chatter.



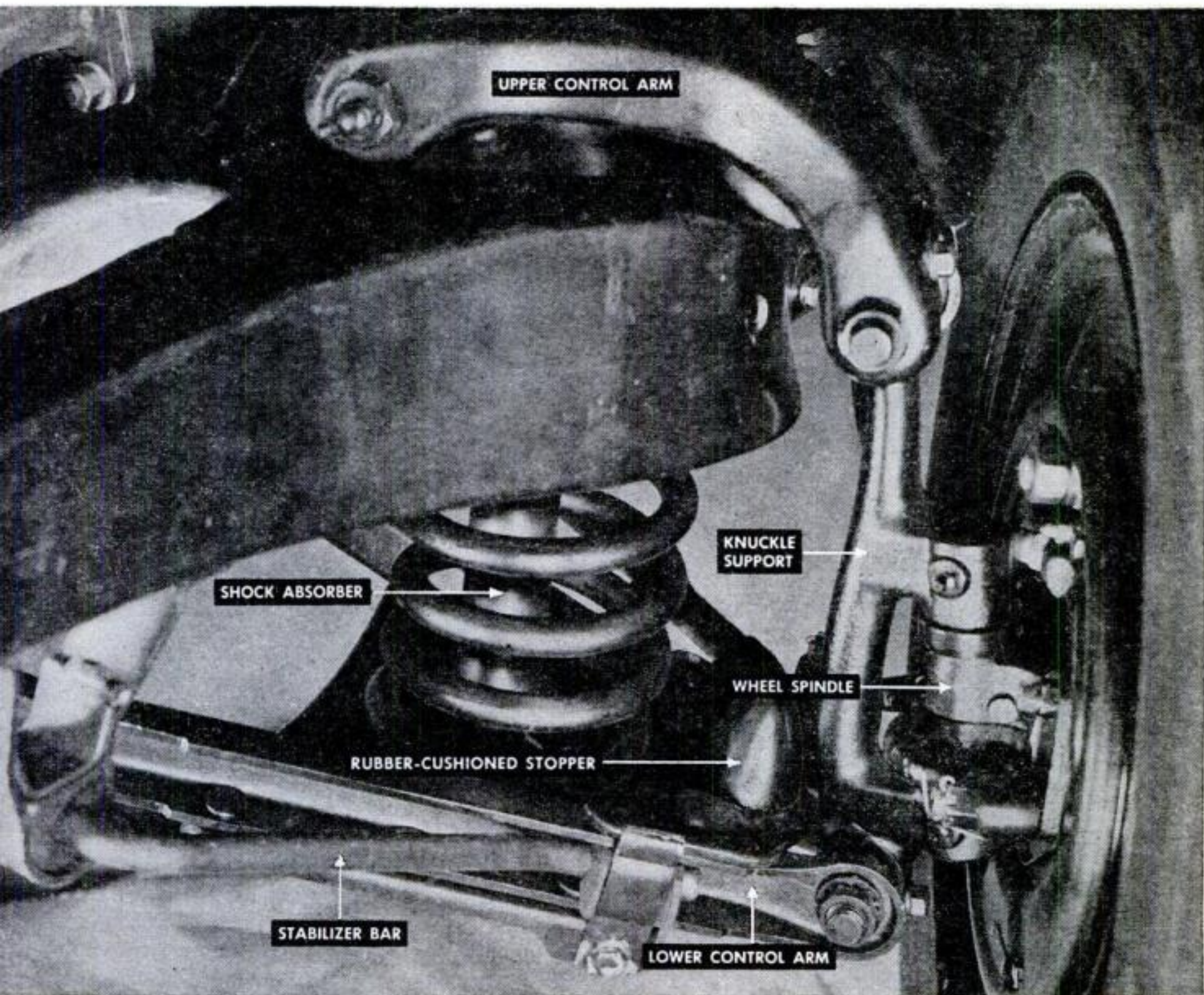


**New drive** incorporates semi-elliptic rear springs, replacing old transverse "buggy" spring. All driving and braking forces between axle and frame are transmitted through springs instead of through the radius rods and torque tube that have now been discarded. This gives more comfortable starts and stops. Cushioned engine anchorages are now only to hold engine in cradle instead of to transmit push of rear wheels to frame. This helps insulate body from engine vibration. Springs are 50 inches long and 2 inches wide. Shackles and spring eyes have compression-type rubber bushings, require no lubrication. Leaves have liners between them. Differential assembly can be replaced simply by pulling out axle shafts and disconnecting propeller shaft at rear universal. Use of hypoid instead of spiral bevel gearing lowers drive line  $1\frac{1}{2}$  inches at rear and reduces tunnel height necessary in rear of body. Rear-axle ratio is 3.73 to 1, with 3.54 or 4 to 1 optional. Wheels have  $4\frac{1}{2}$ - instead of 4-inch rims, carry 6.00 x 16 4-ply tires. Rear wheels are bolted directly to rear-axle shaft flanges, and shafts are supported by ball bearings in outer ends of axle housing.



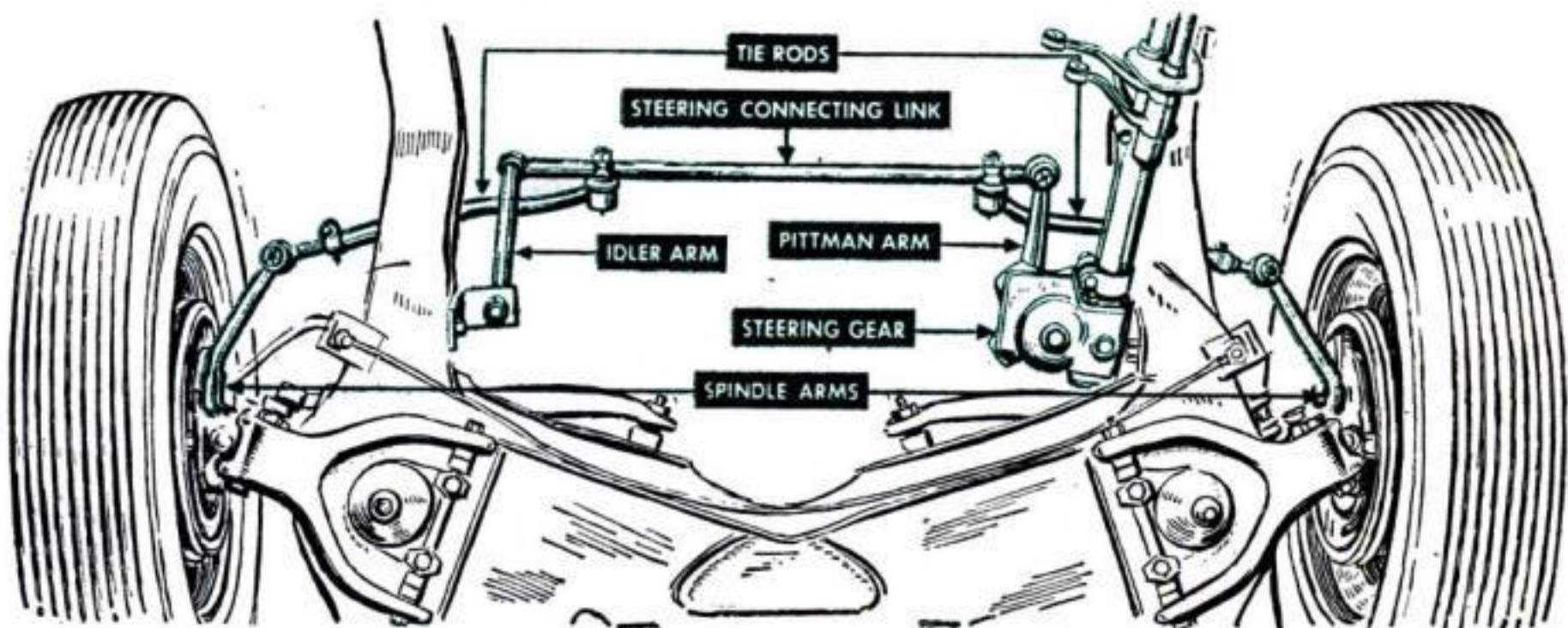
**Box frame** is continuous to "kickup" at rear axle. Exceptionally rigid, frame is even more resistant to twisting and bending than X-type it replaces. Tube in picture is exhaust pipe.





**Heavy cross-member** is used at front of frame to provide for new individual wheel suspension. Telescopic shock absorbers held by only two nuts are mounted in center of coil springs. Shock units can be replaced without jacking up front wheels. There is no danger, either, of up-

setting "geometry" of steering or misaligning front wheels. New steering eliminates "wheel fight" on rough roads. Upper and lower support arms for frame are clearly visible. Small transverse rod at lower part of photo is 11/16-inch stabilizer bar. None is used at rear.



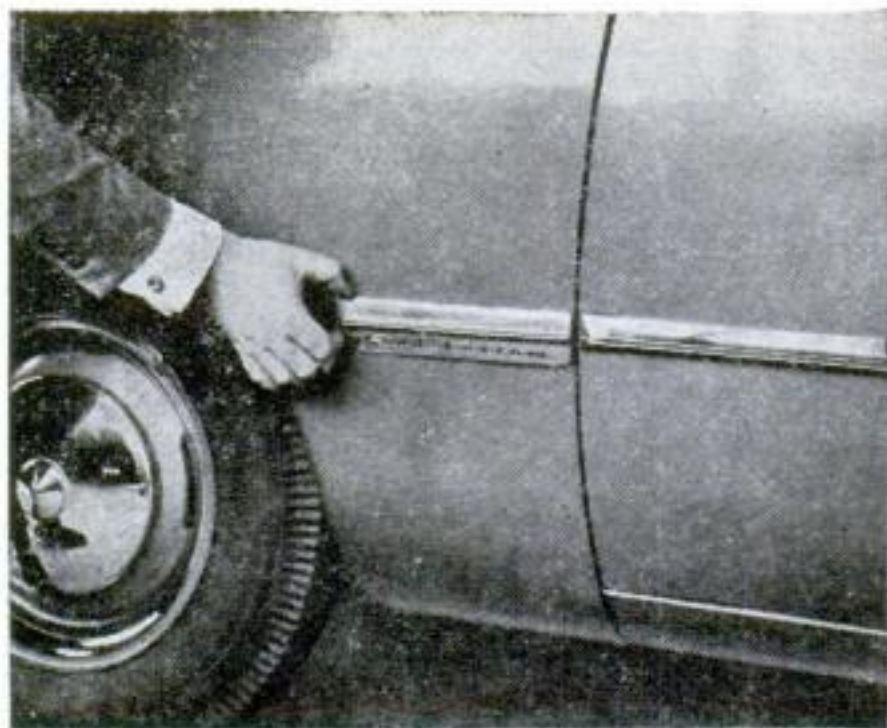
**Parallelogram type of linkage** is used on steering. Improved geometry reduces tire squeal often associated with independent wheel suspension and boosts tire mileage. Because pivot

point of tie rod is on same center line as that of wheel suspension, linkage and wheel move through same arc when wheel strikes bump. This assures constant correct adjustment.

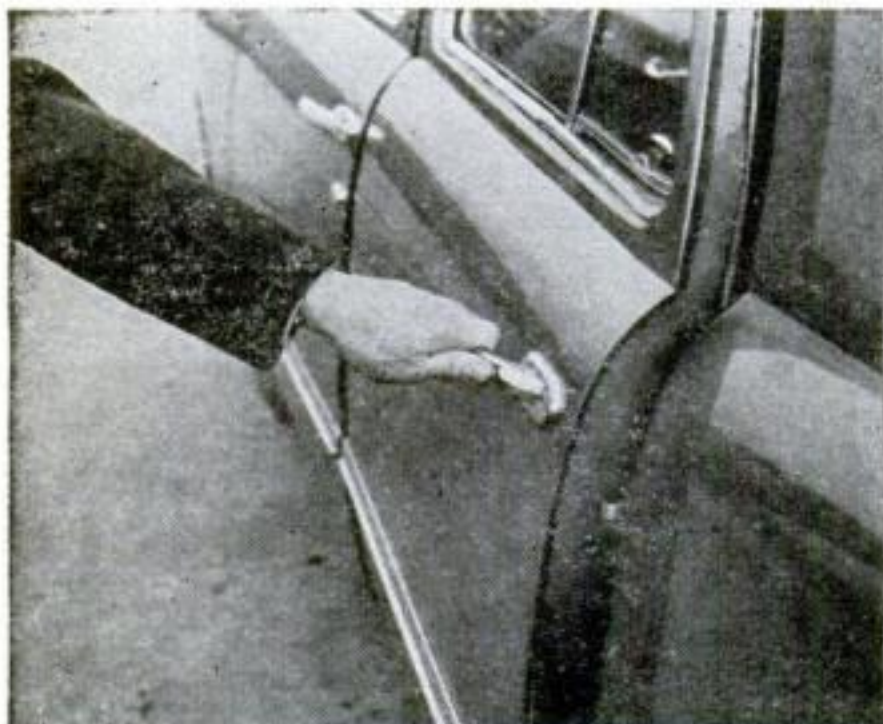




**Hinging both doors** at front is a safety measure. Slightly thinner body walls and doors below belt line help increase interior space. Window area is 101 square inches more than last year.



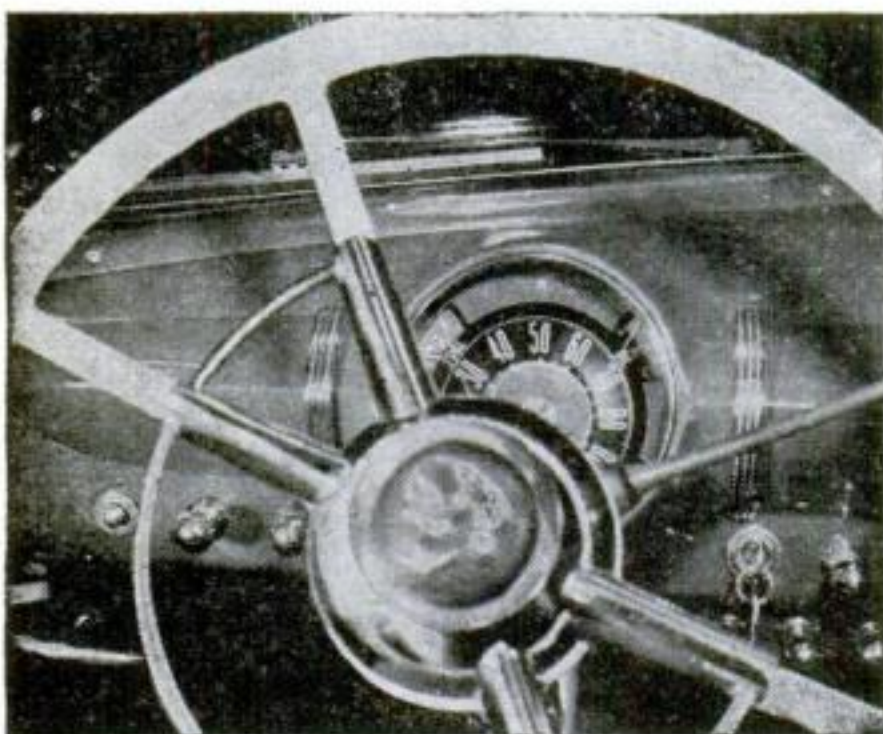
**Chrome strip** is intended to take shock if door from an adjoining car is opened against the body. As in all the new cars, a dented fender means a body job in the repair shop.



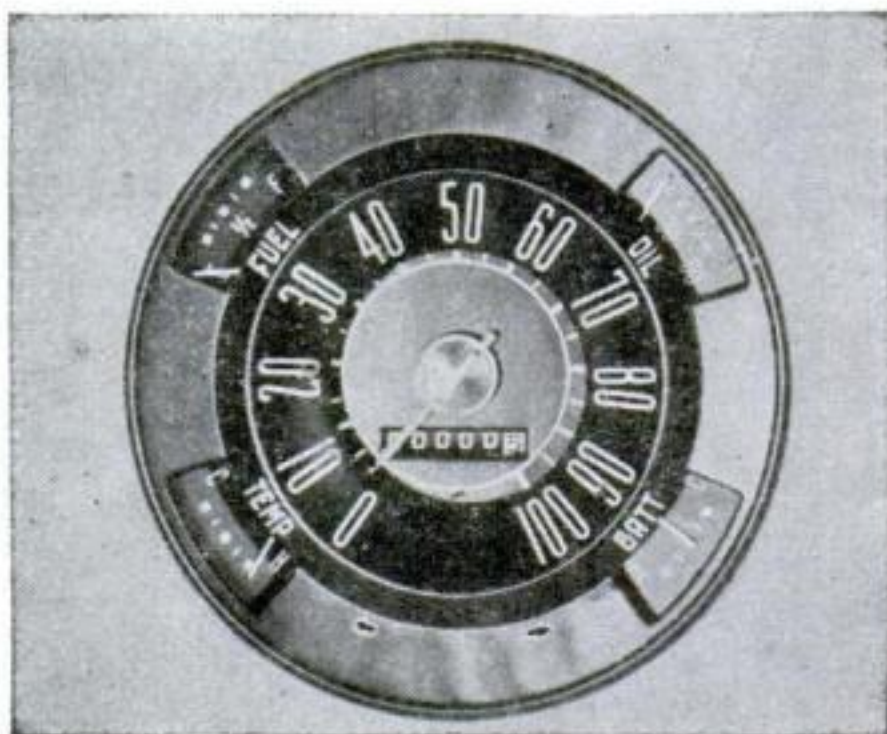
**Door handles** are of pull type. Push buttons on molding lock doors from inside. You can't lock door from outside, however, without key, so you can't snap-lock yourself out.



**Rest of hardware** is conventional. Dum-dum deadener applied freely throughout body keeps squeaks, rumbles at a minimum. Maximum inside body width at belt line is 3 inches greater.

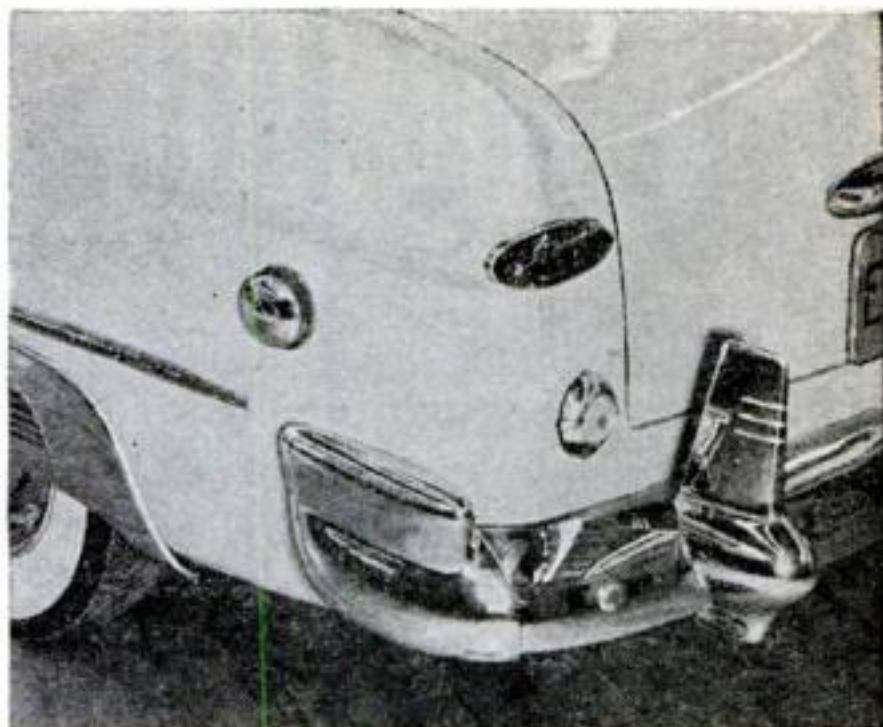


**Controls grouped** behind wheel are starter, windshield wiper, lights, fresh-air vents, ignition, choke, defroster, temperature, heater switch. Four-spoke wheel is extra.



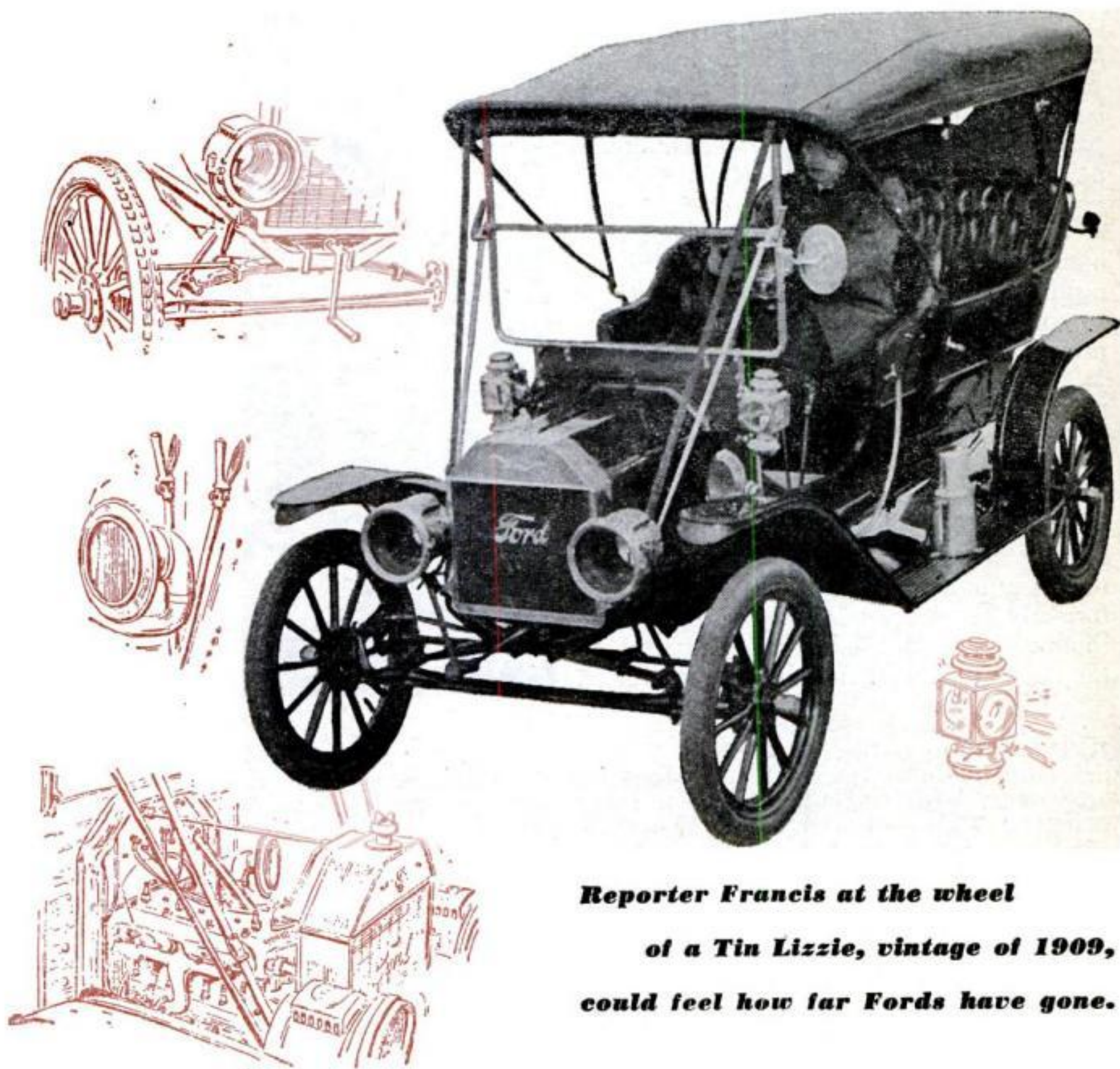
**Fuel level, oil pressure, engine temperature, and charge-discharge battery indicator** are grouped around speedometer within single housing. Radio and clock are optional.





Parking brake is direct-pull type. On panel above it is button, located left of steering column, for starting engine. Hood-release mechanism is just to the left of brake handle.

Ford will stress available optional equipment this year. Here the backing light, the bumper wing, the bumper guard, and the metal frame for license plate are all optional.



**Reporter Francis at the wheel  
of a Tin Lizzie, vintage of 1909,  
could feel how far Fords have gone.**



# Laying 100 Hands on a Plane

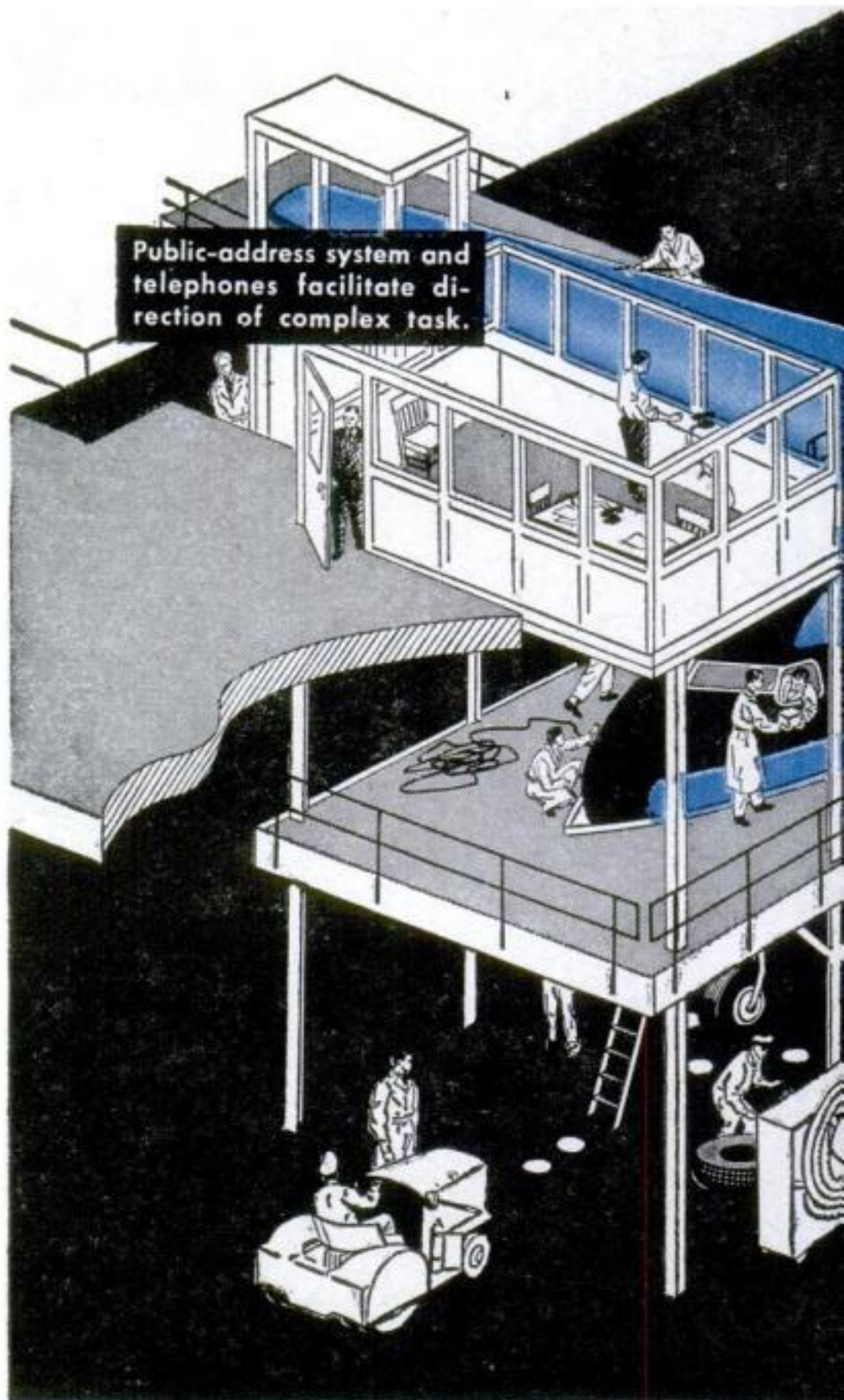
**This new workbench for big air liners permits mechanics to swarm all over them for a high-speed overhaul.**

*Drawing by Ray Quigley*

**T**EN minutes after a DC-6 enters United Airlines' new maintenance base at San Francisco, it ceases to be a flying machine and becomes part of a sturdy, many-balconied building. The huge plane can then be taken apart as quickly as a circus tent.

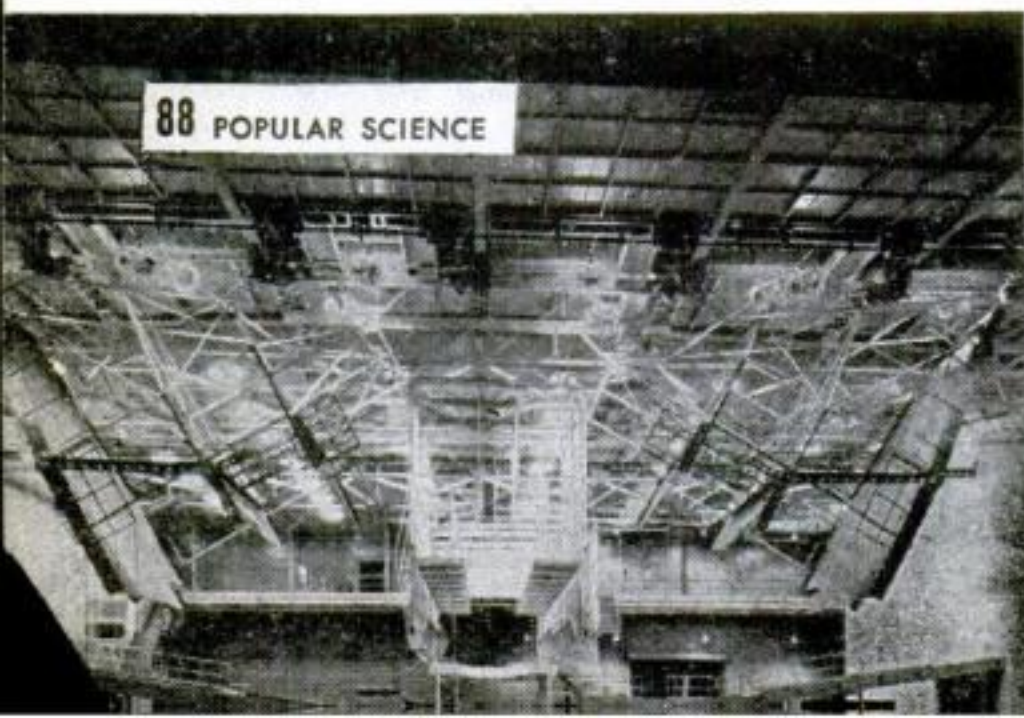
Fifty men can work on the plane at once, almost as effectively as though each part were clamped in a vice on a separate workbench. Examining, cleaning, repairing, and painting the wings, fuselage, and tail are no more difficult or dangerous than refinishing your kitchen wall. And from this immense mechanical maze, propellers, engines, instruments, hydraulic apparatus, and cabin furnishings can be whisked off to nearby shops so completely equipped and highly mechanized that they resemble auto factories.

About four times a year, a tractor will tow each one of United's 70 four-engine DC-6 and DC-4 liners into this modern fountain of youth. The plane's nose will fit snugly into a permanent platform, jacks will lift the weight off its landing gear, and metal scaffolding will be wrapped snugly around it. Then, in about 20 percent less time than formerly was needed, the big liner will be so thoroughly overhauled it will roll back to the runways looking and acting brand new.

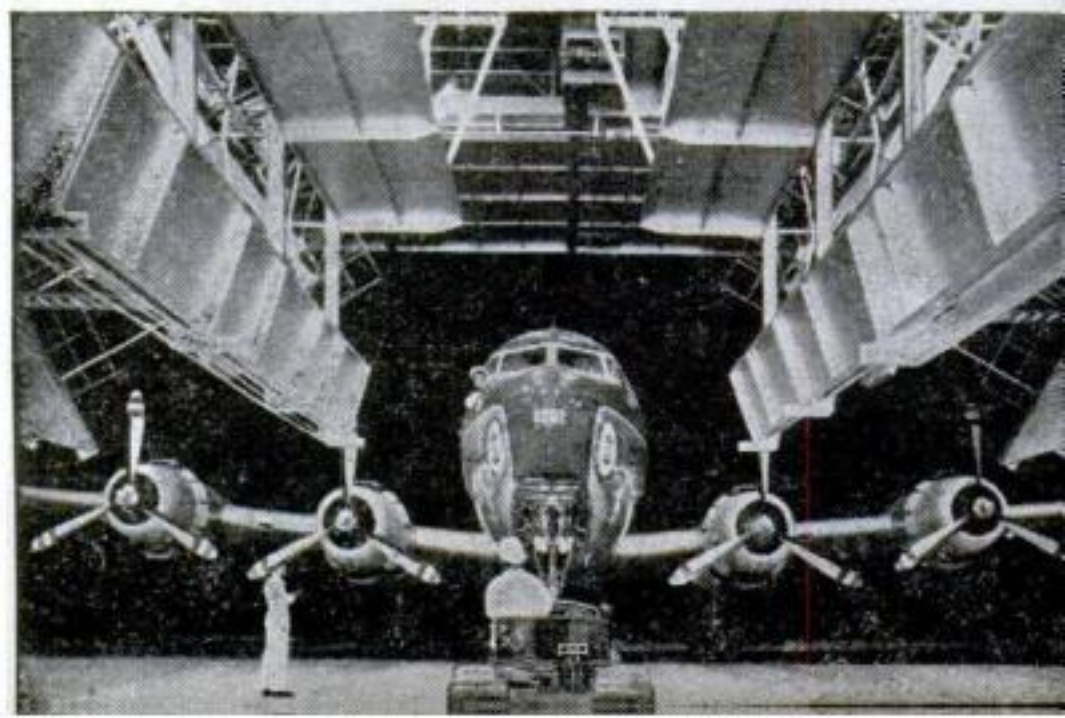


Public-address system and telephones facilitate direction of complex task.

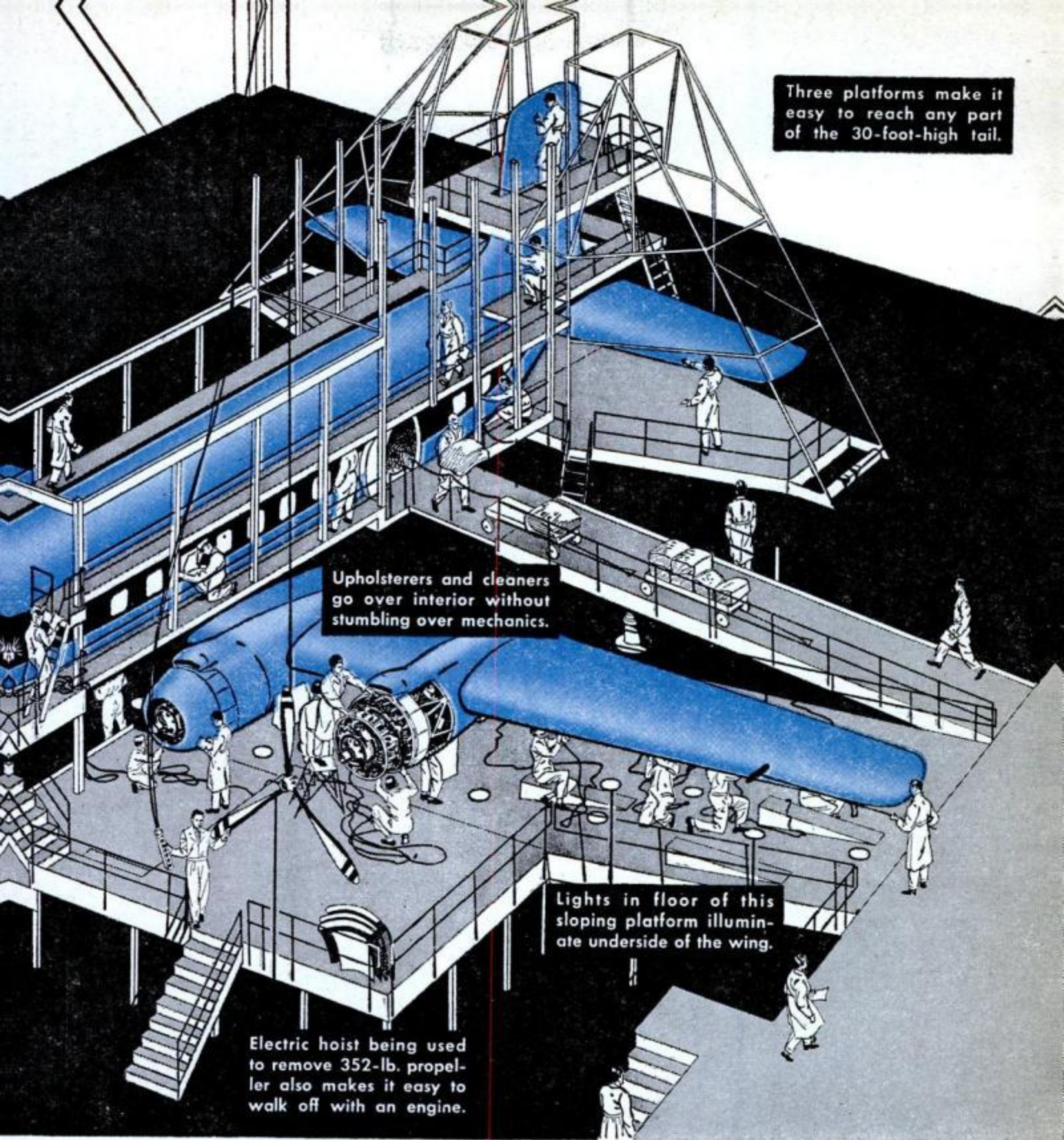
**1. This 130-foot-wide, 35-foot-high dock is the entry to United's new 116-acre shops for overhauling huge air liners. A 6-hp. motor swings up its 25-ton steel door in just 15 seconds.**



**2. Pushing buttons will swing this mass of scaffolding around the liner. Catwalks will fold down alongside the fuselage, and a ramp will rise from the floor to the sill of the cabin door.**







Three platforms make it easy to reach any part of the 30-foot-high tail.

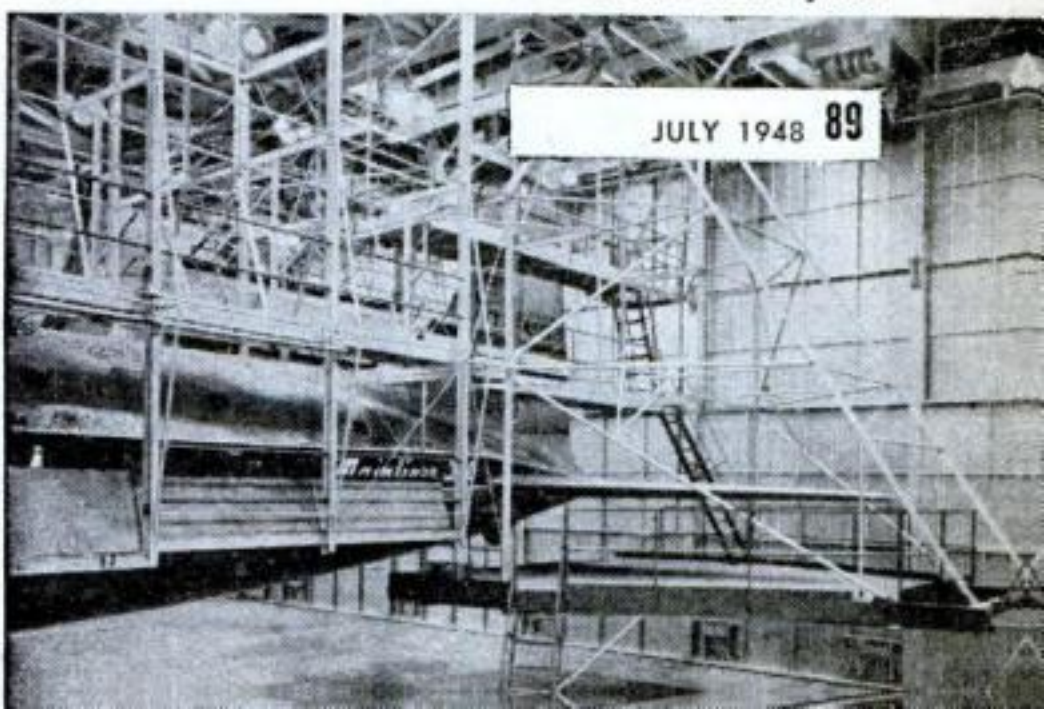
Upholsterers and cleaners go over interior without stumbling over mechanics.

Lights in floor of this sloping platform illuminate underside of the wing.

Electric hoist being used to remove 352-lb. propeller also makes it easy to walk off with an engine.

**3. A ton of framework descends from the ceiling around each side of the plane's tail. Enough light for nearly 2,000 average homes is required to illuminate this gigantic base.**

**4. Nobody has to scramble over the plane. Every part can be reached from a safe platform. This dock will also accommodate the big Boeing Stratocruisers scheduled for use next year.**

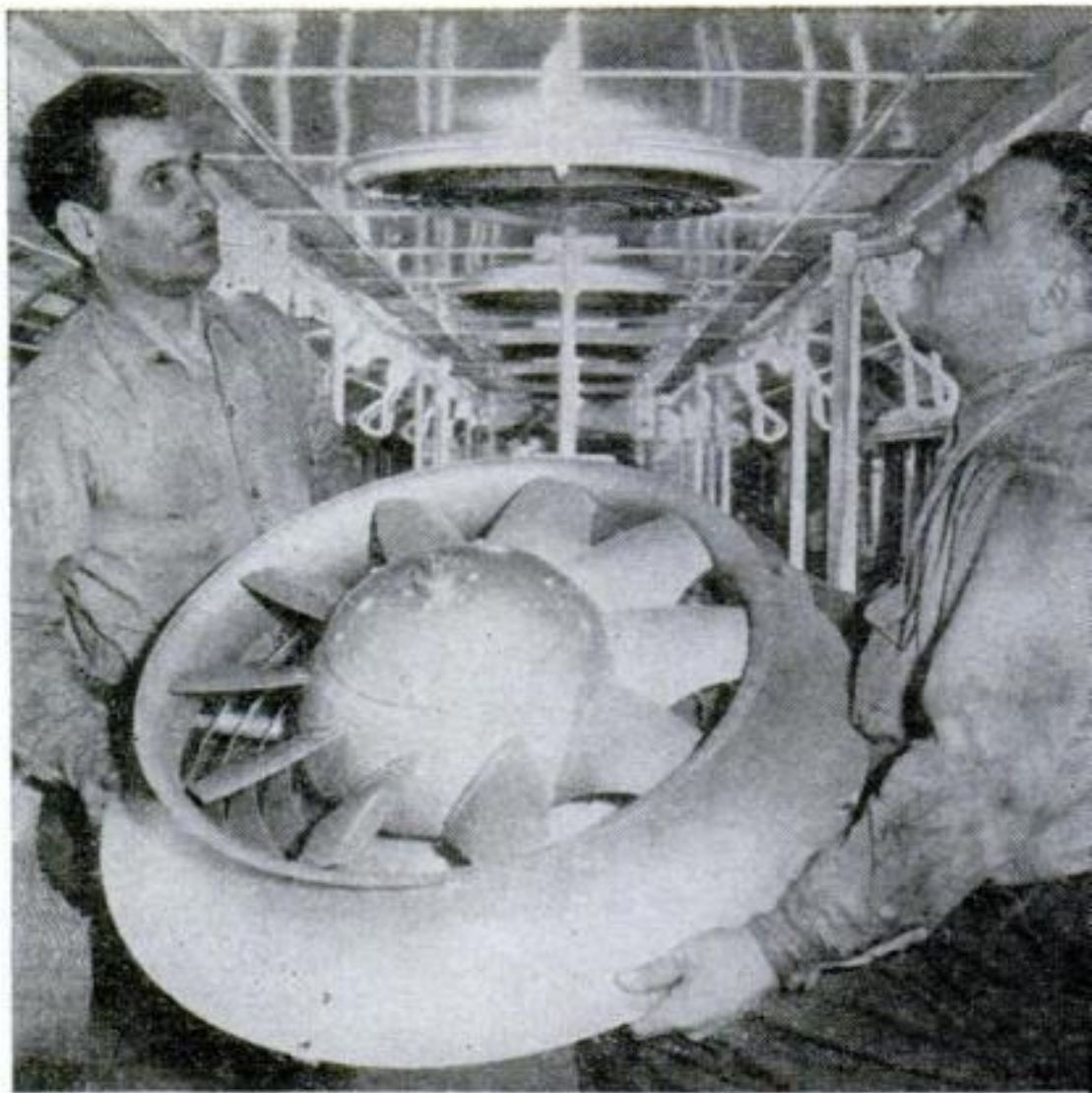






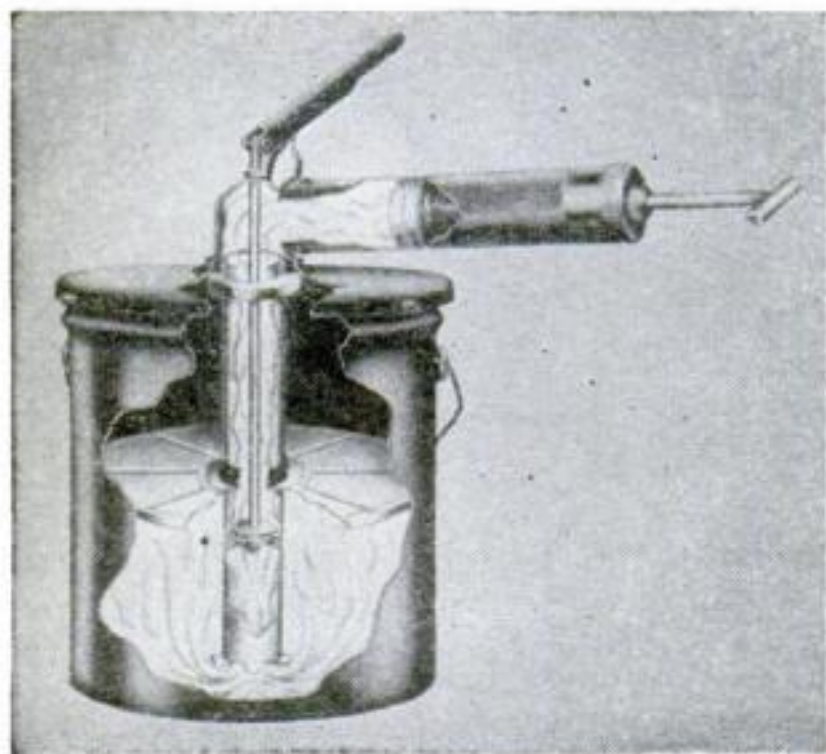
## Cleaner Hangs Up

A HANDLE hinge that opens out flat lets this new Singer vacuum cleaner hang against a closet wall. The fan and motor housing, only five inches thick, can go under lower furniture than most cleaners. This low profile is made possible by use of a horizontal motor with a shallow-pitch fan on each end of its shaft.



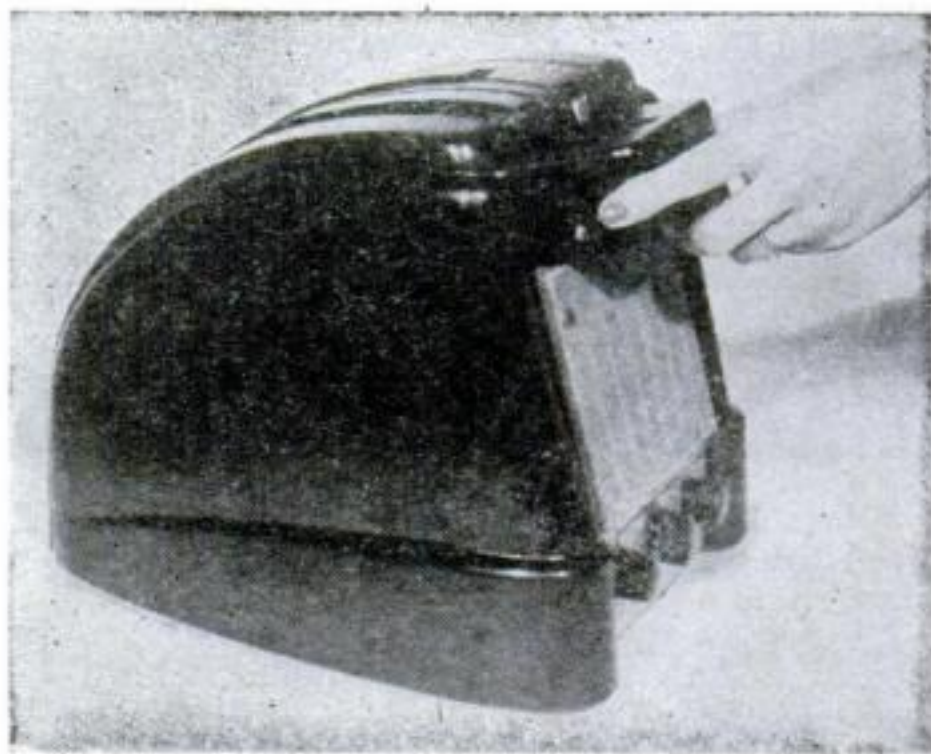
## Breeze Spreaders

THE workmen above are installing one of the new axial-flow fans that are being tested this summer in New York subway cars. Ten blades push air through five diffusion rings that spread it uniformly over the car, instead of blasting the breeze directly down a few riders' necks. The fans, made by Westinghouse, are thermostat-controlled to run faster on hot days.



## Pump Saves Grease

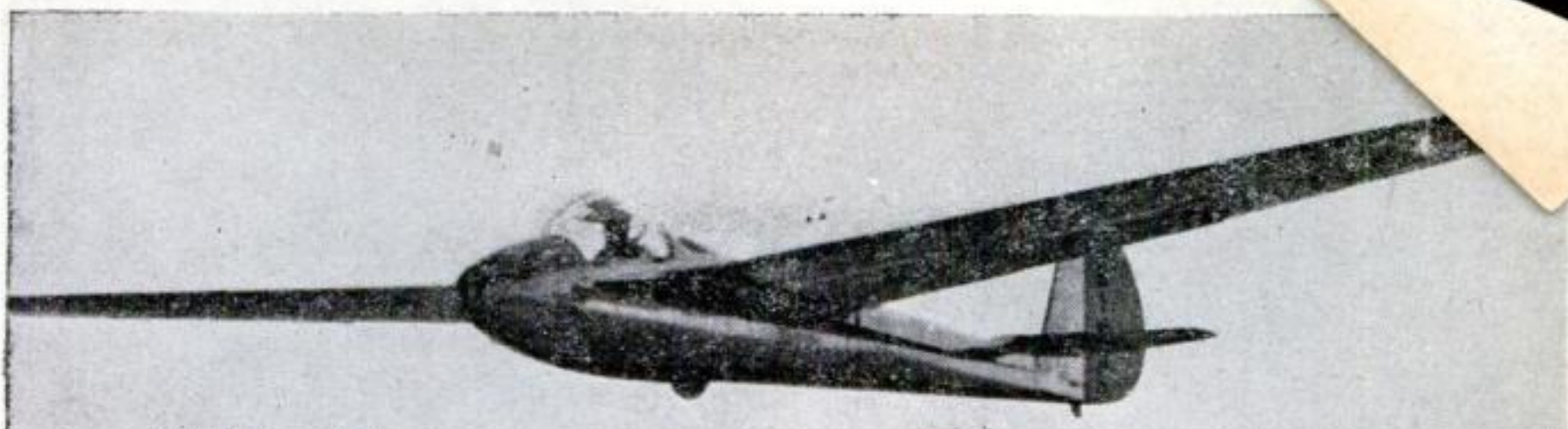
A NEW pump to load grease guns gets every last gob out of the pail. As shown, a follow plate is sucked down inside the pail as grease is pumped out, scraping the can and sealing it against dirt. Comet Equipment Co. makes the pump.



## Cartridge Loads Recorder

You can load this RCA wire recorder like a gun: just slip a cartridge into a slot, as shown above. Both bothersome threading and rewinding delays are eliminated: the cartridge holds two wires that run in opposite directions, one rewinding while the other is in use.

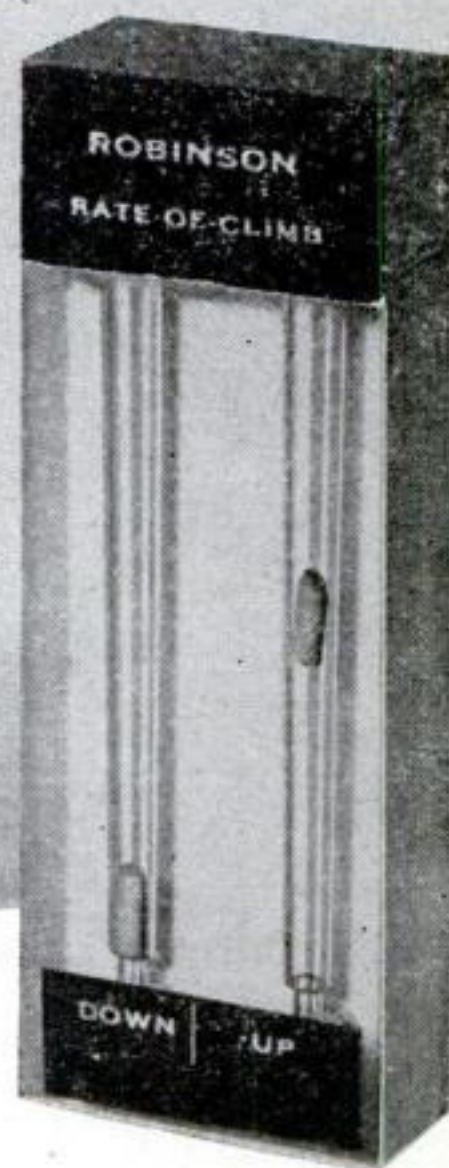




# Flying in Red and Green Air

*Photo by Emil Lehecka*

Colored pellets—red for down, green for up—in the tubes of the patented variometer at right show a pilot whether his sailplane is losing or gaining altitude. The instrument, operated by air pressure, registers changes of as little as 3 feet.



**Sailplane pilots learn flying in its purest form by chasing up-currents to ride skyward like a soaring bird.**

*PS photos by W. W. Morris*

**L**ATE last month several scores of men and women jounced by automobile and trailer into the hill-hedged community of Elmira, N. Y., on a strange quest. They were starting a hunt for green air. For a certainty, they would find red air too.

For these were glider enthusiasts, ready for a fortnight of motorless flight at the annual National Soaring Contest in the world's best craft for learning to fly. "Green air" is their name for up-currents to lift their planes aloft. "Red air" is down-currents, which they try to avoid. The names come from the altitude-change instruments in their cockpits; these contain pellet indicators

colored red for down and green for up.

"Lot of green air today," a pilot will say, beaming, as he lands after a long flight. Or, complaining, "The air's red all over."

Flying in red and green air is a sport, and an expensive one: a fine sailplane, man's most graceful mechanical creation for flight, retails for around \$3,000. Soaring is also a science—one far more complicated than operating a light powered airplane.

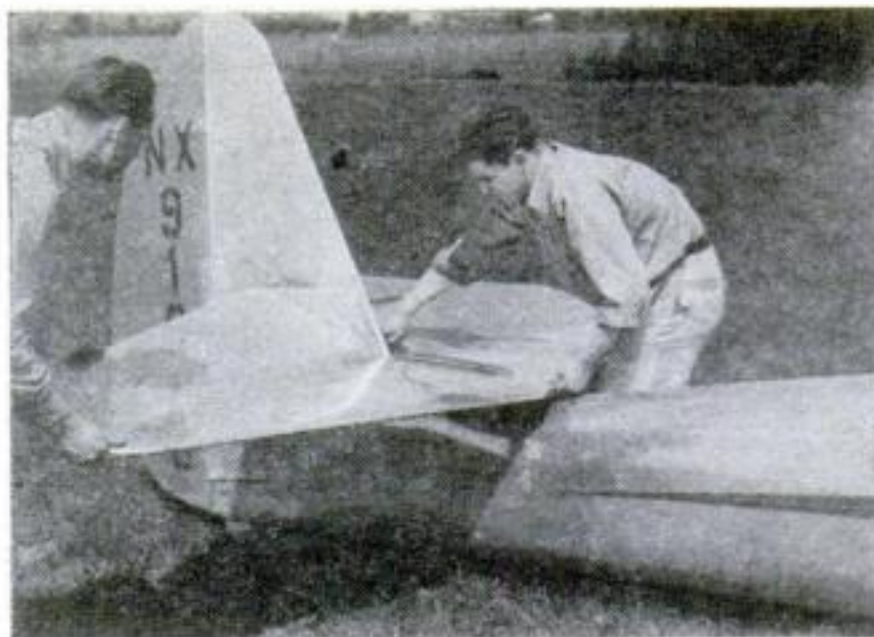
And because it gives a pilot the feel of his element, learning the science of soaring is good flight training. For soaring depends, as most everyone knows, on upward currents of air, called thermals, caused by uneven heating of the earth's surface, or by air being bounced upward when winds hit hills or mountains (PS, June '46, p. 104).

But the tricks for riding those currents of air, the novice at motorless flight soon learns, are full of contradictions. When a pilot tries

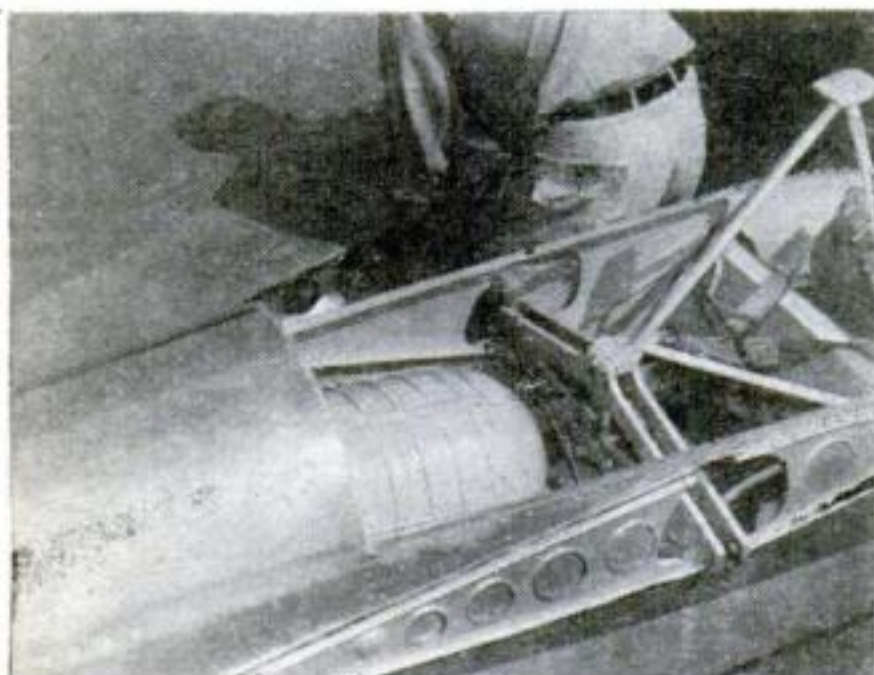




**Sailplane arrives** at Elmira, N. Y., in auto-towed trailer. Wings and horizontal stabilizer rest in specially designed nests. Crew member lets down tailgate to begin assembly of plane.



**Stabilizer** is fixed in place simply by screwing three nuts on permanent bolts and attaching fairing by half-turn fasteners. Plane is a Schweizer 1-21 of unusually high performance.



**Wings are attached** with nuts and so-called safety pins. Controls for ailerons, elevator, dive brakes, spoilers are connected with clevis pins. Rudder controls were not detached in transit.



**Hatch goes on** to complete assembly job. Tripod protects pilot if plane overturns on the ground. Bomblike object is oxygen bottle. Experienced crew can assemble plane in 15 min.

for distance—the international record, held by a Russian, is 465 miles—he is likely to pour upward of 30 gallons of water into his wing tanks: a motorless plane flies better when it is heavier, even though it is buoyed up only by air currents. And a soaring pilot has more need for an oxygen mask than a lightplane pilot: the international altitude record, held by a German, is 23,434 feet, and the average soaring pilot cruises thousands of feet higher than his lightplane comrade.

Even the best glider pilots still have much to learn about soaring. Only lately has the “standing wave” in mountainous country been discovered. When wind hits a high mountain ridge, it flows over and down the other side—and there, unaccountably, a tremendous upward wave develops. Pilots have soared to great heights on such waves.

Lately, too, pilots have worked on what they call dynamic soaring. Birds soar dy-

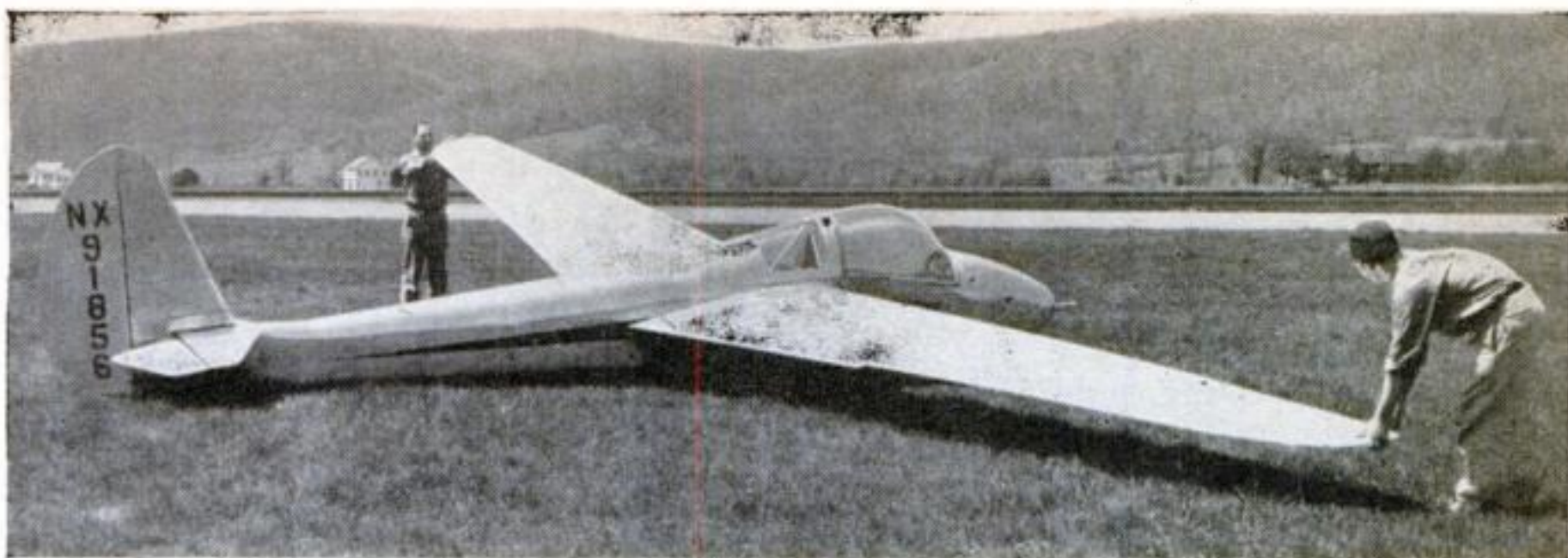
namically by sensing a coming gust. A gust boosts a plane's air speed. The bird's trick, not yet mastered by man, is to anticipate the gust, raise its nose, and gain altitude when the gust hits.

Soaring pilots, like windjammer sailors, have a peculiar pride in their art. Soaring, an enthusiast will tell you, is flying at its purest, since it does not depend on aid of an engine. Most pilots “fly power”—depend on propeller thrust. What soaring could teach them was pointed up in a remark made the other day by Shelley Charles, crack pilot of Eastern Air Lines and holder of the American motorless altitude record:

“When you learn to fly a wing instead of power, you gain new confidence in your airplane. Even if I lost all the engine power on an airliner, with glider knowledge I'd have no fear and would feel much better about landing safely.”

END





**With cockpit canopy on**, the Schweizer is ready to fly. It has a gross weight, with ballast, of 990 pounds, a wing span of 51 feet, length of 22 feet 1 inch. Its maximum cruising speed is

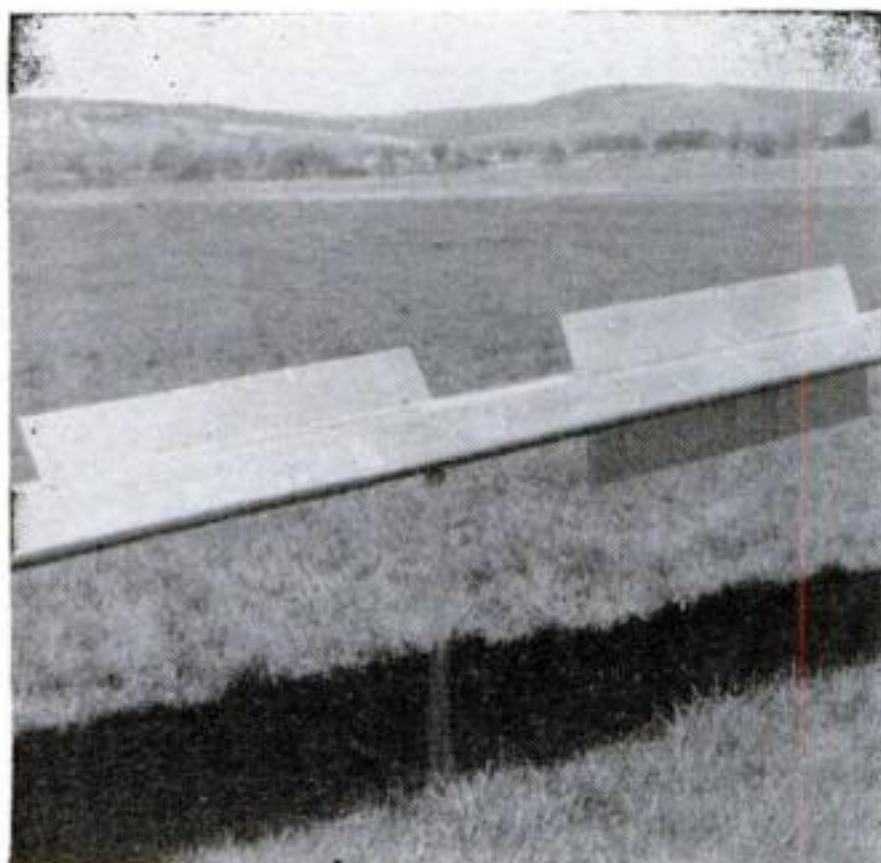
85 m.p.h. The landing gear consists of a 13-inch pneumatic front wheel and a solid-rubber tail wheel. A five-foot skid with a steel shoe under plane's nose serves as a ground brake.



**Two tanks** hold 34 gallons of water for ballast. Increasing the sailplane's weight provides greater forward speed at a lower gliding angle, thus permitting flights of greater distance.



**Instrument panel**, more complex than in light-plane, has two variometers, oxygen blinker, pitch indicator, spoilers control, tow-cable release. Knob at far left is for the dive brakes.



**Dive brakes** (right) open above and below wing for quick descent at reduced speed. Spoiler, inboard, disturbs flow of air over top of wing to reduce lift and aid in "spot" landings.



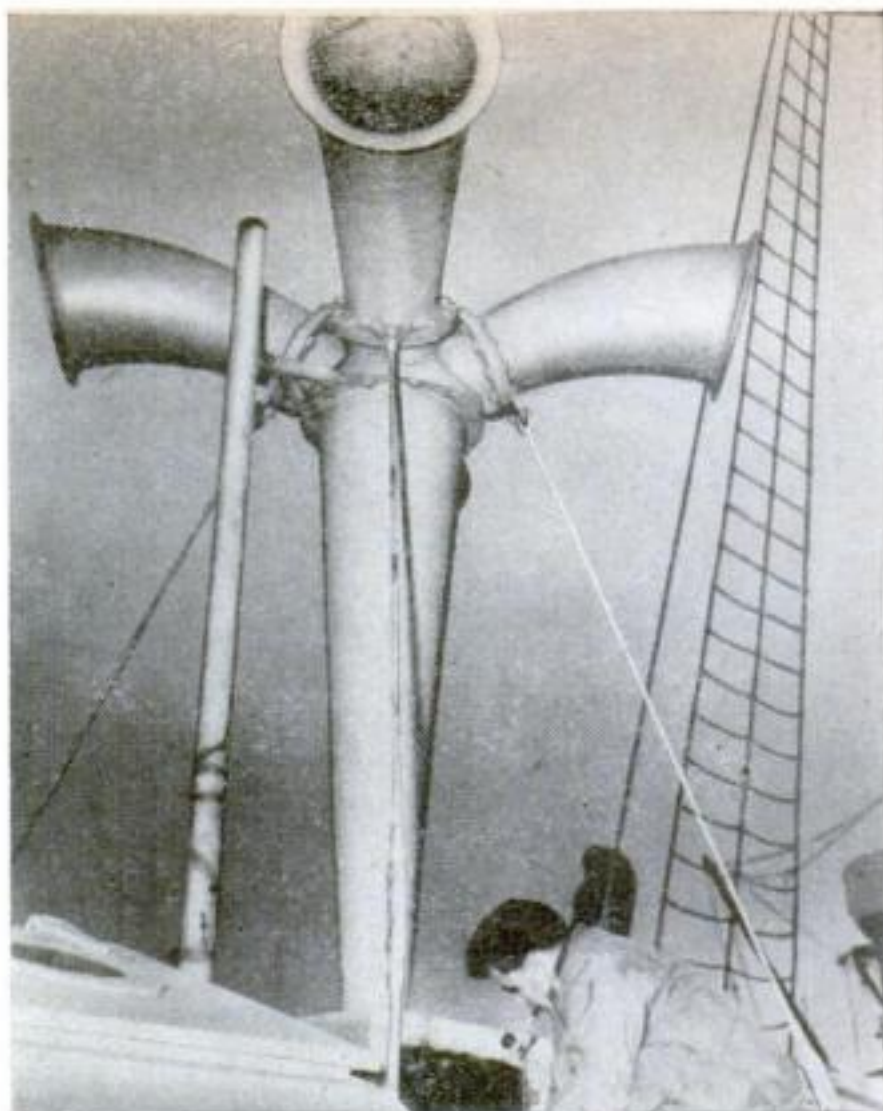
**Patented hook** under nose secures and releases tow cable. Takeoffs are made by towing glider with car or airplane. Tow planes charge \$2 for first 1,000 ft., \$1 for each additional 1,000.





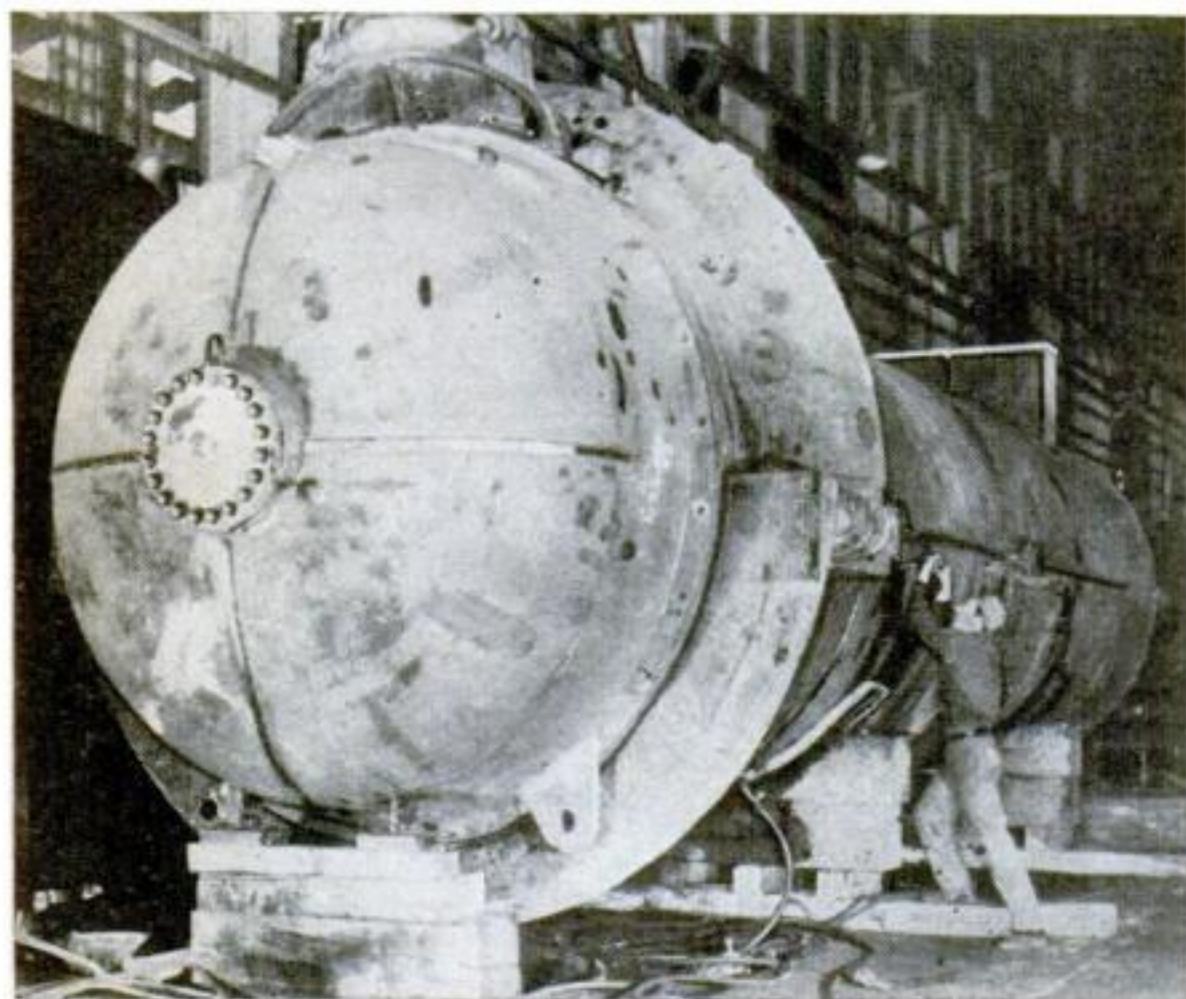
## Crane Sets Up Wall

WITH this compact crane, one man can raise a whole concrete wall into position. The crane's "hook" is a plate that bolts to the edge of a concrete slab precast in a horizontal form. The mast is formed by two I-beams welded to a steel pipe that serves as a hinged base. When the winch is turned, rollers on the plate run up the underside of the beams, setting the slab on edge. The Portland Cement Assn. developed the crane as a labor saver.



## Huge Horn Guides Ships

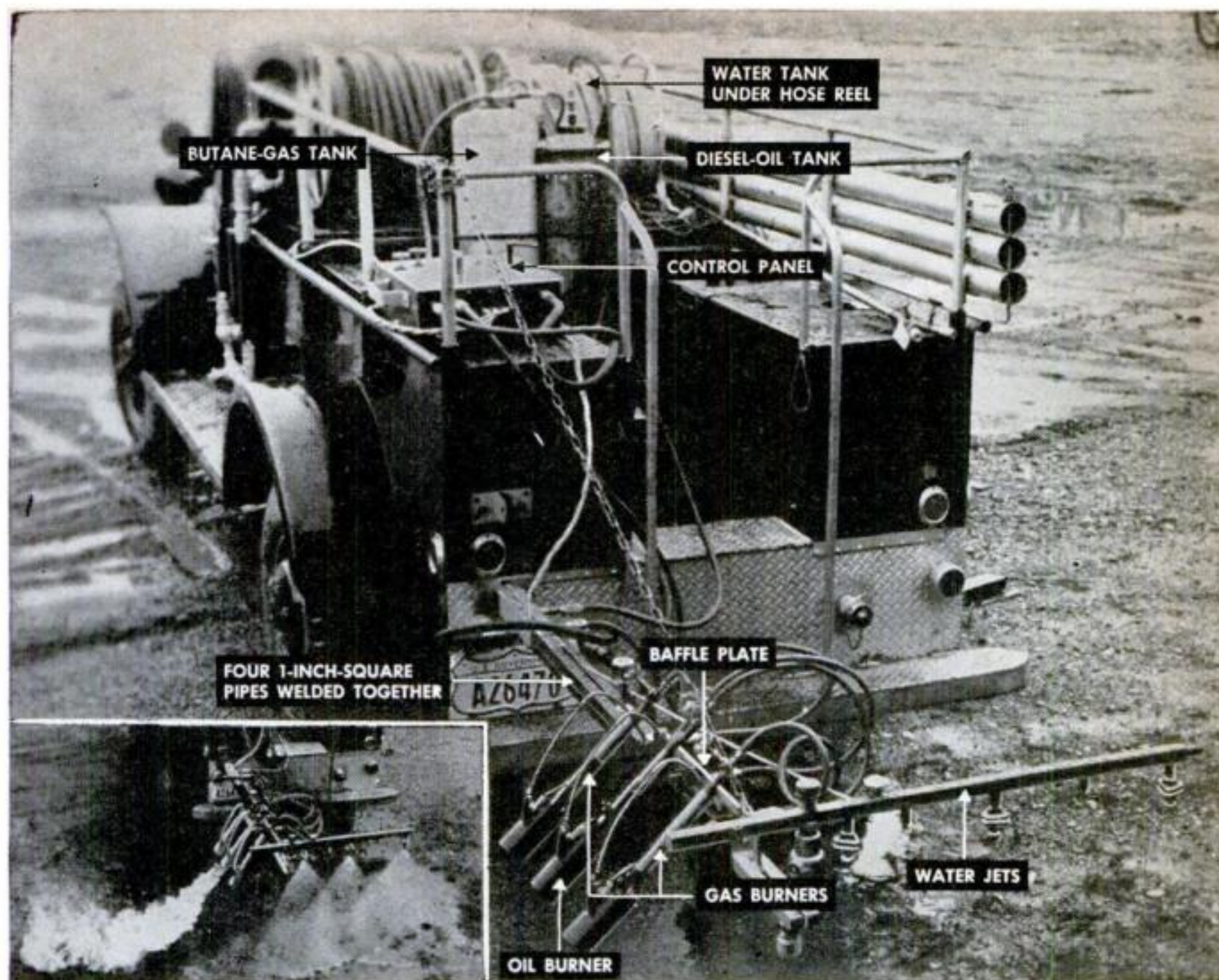
THIS man-made mushroom is the foghorn that booms out from the upper deck of Ambrose Lightship to guide vessels into New York Harbor in soupy weather. Its hoarse shout, formed by steam blasting under high pressure against vibrating disks, carries five miles. When visibility is down to that range, the horn is sounded for three seconds, five times a minute. The ship, manned by the Coast Guard, also has a light visible 14 miles and a 100-mile radio beam.



## Navy Gets Big Pressure Room

IN THE steel chamber at left, the Navy now can test underwater equipment at pressures up to a ton per square inch—the same as a mile down at sea. It's 40 ft. long, 9 ft. in diameter, and has walls  $3 \frac{15}{16}$  in. thick. The rounded end comes off to admit large pieces of equipment. The 220-ton drum had to be shipped on a special railway car from Barberton, O., where it was made by Babcock & Wilcox, to the Naval Ordnance Laboratory at White Oak, Md.





Pump truck throws flame to set backfire while wetting strip of grass to control its spread.

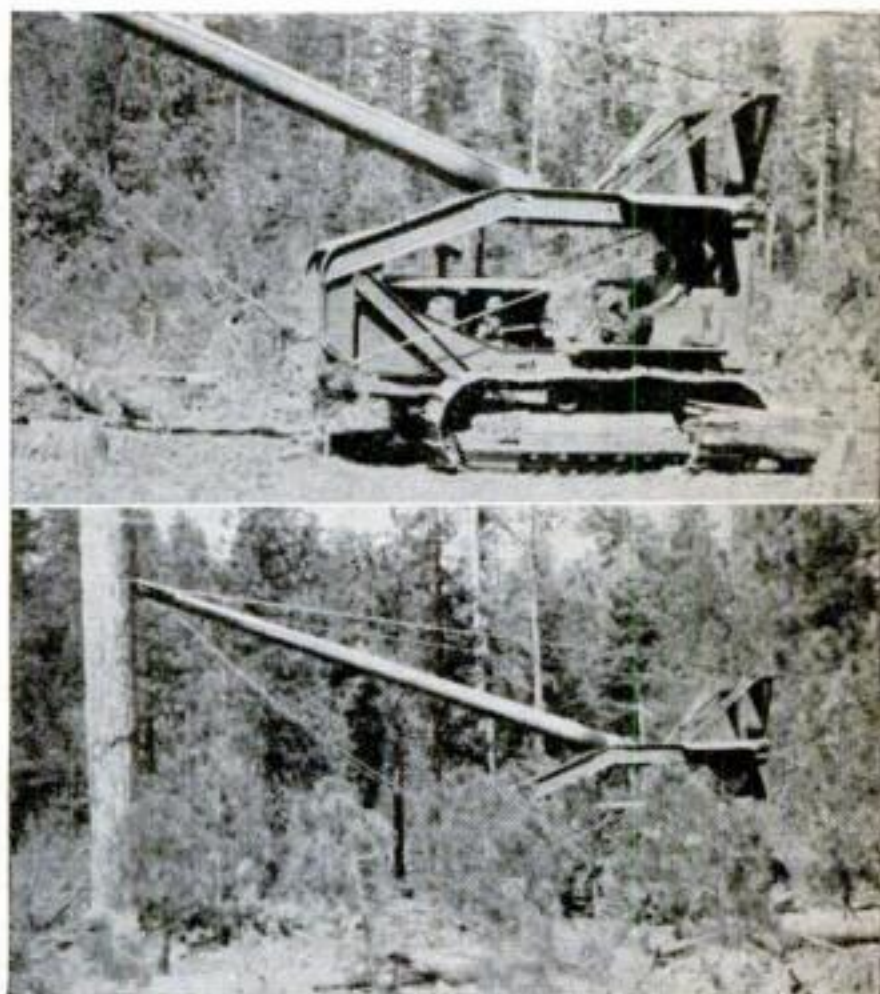
## ***New Machines Fight Forest Fires***

**T**HE U. S. Forest Service is arming its rangers with two new mechanized weapons for their unending war against fire.

One, shown in action at right, helps to prevent fires by clearing timberland of dead trees. The other, pictured above, speeds the setting of backfires to keep grass fires from spreading.

A standard pumper truck fitted with a flame thrower to set the backfire while rolling along at 8 to 10 m.p.h., the machine has a battery of water jets that simultaneously wet down a strip of grass behind the backfire to keep it under control.

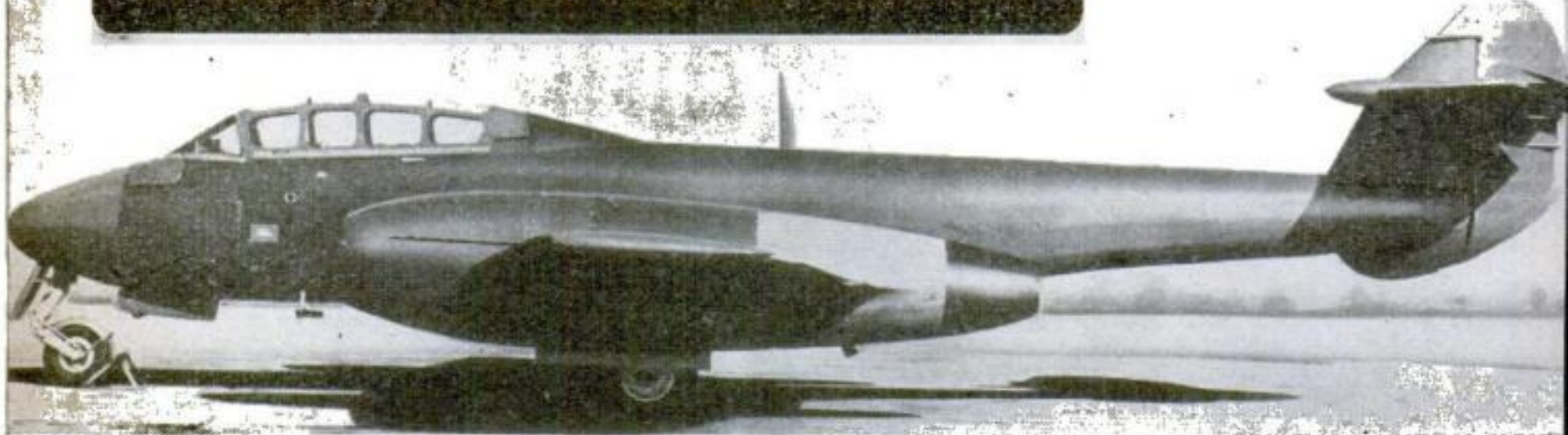
The burner is a Diesel-oil nozzle between two electrically ignited butane-gas jets. It can be adjusted for close range or to throw a flame 10 feet. The water jets use 1.7 to 8 gallons a minute to deliver a driving spray or a floating fog over a strip one to eight feet wide.



**One man**, using this tractor with its 30-ft. steel boom, can nose over 200 to 300 dead trees a day—a week's work for two men with a power saw. Trunks are then removed, cutting fire hazard. Heavy angle-iron support for boom protects the operator from falling branches.

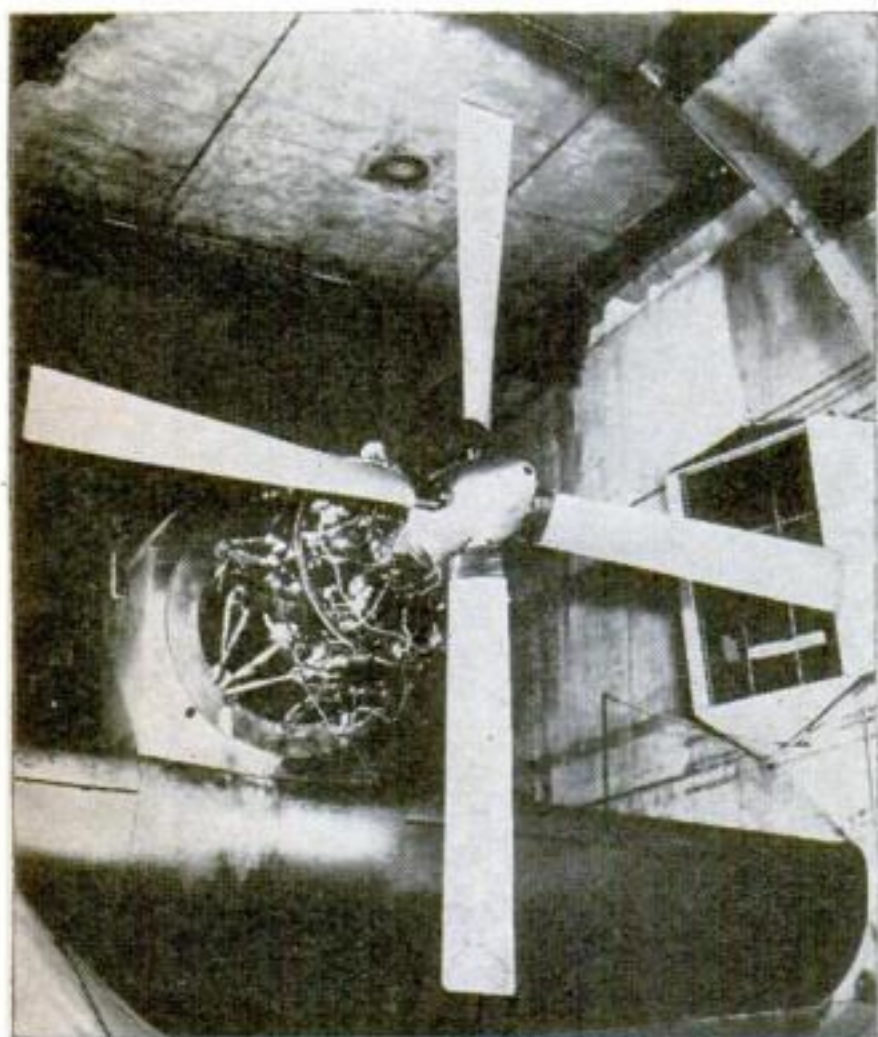


## What's New in Aviation

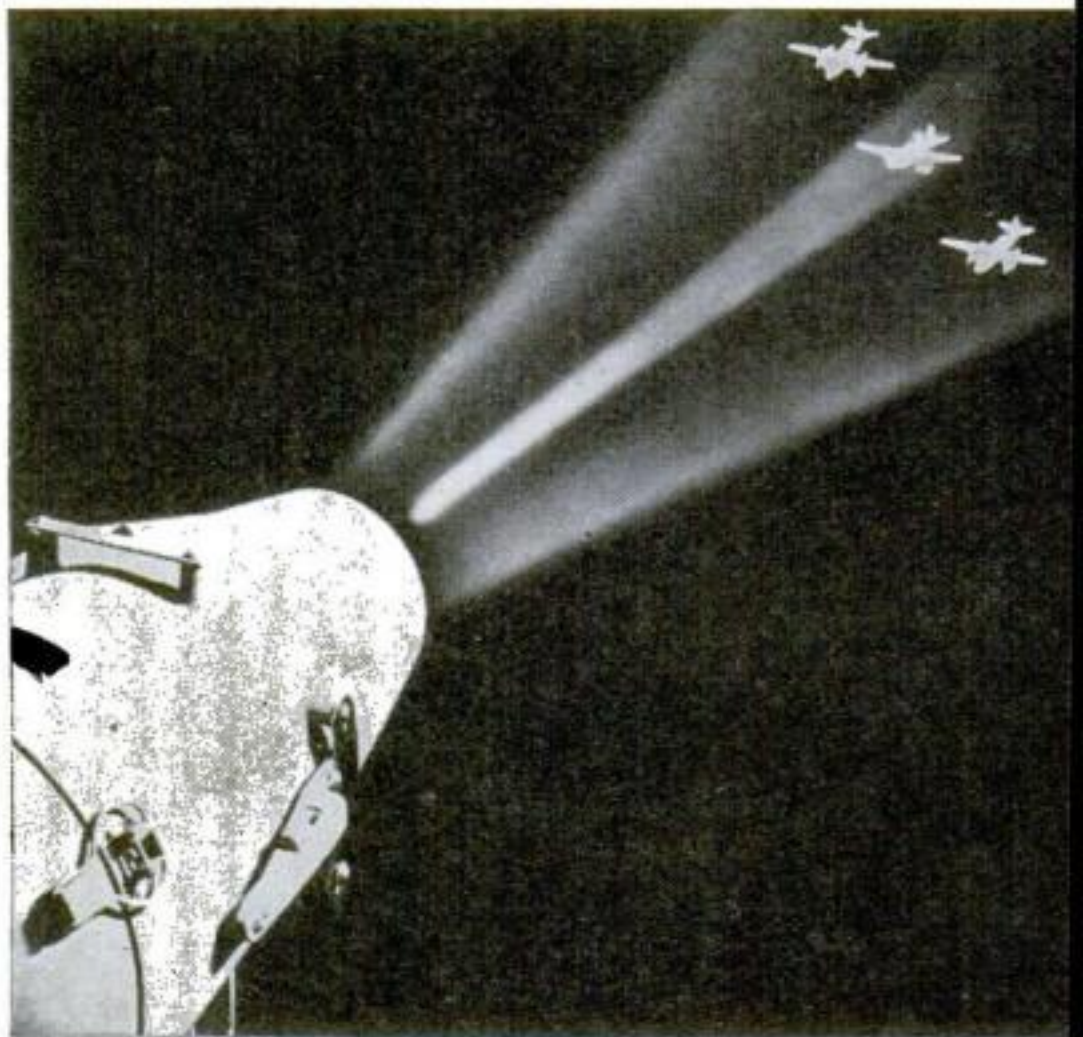


**New British Jet Trainer.** The Gloster Meteor VII, shown above, is designed to bridge the gap for student pilots between piston-engined advanced trainers and jet fighters. A modification of the British Meteor fighter, it has two seats and dual

controls, and is powered by two Rolls-Royce Derwent jet engines. Top speed is 585 m.p.h.; rate of climb, 8,000 feet a minute. The plane's U. S. counterpart is the trainer version of the Shooting Star jet, the TF-80C (PS, June '48, p. 86.)



**Prop Is Longer, Lighter.** Sixteen and a half feet in diameter, this new Hamilton Standard propeller saves 200 lb. in weight. The secret is in its four hollow steel blades. To increase sectional rigidity they are filled with hard sponge rubber. Wide tips boost power by increasing the surface area of the blades where they move fastest. Shown in the photo mounted on a 3,500-hp. Wasp Major engine in a test cell, the new propeller is to be installed on many of the new Boeing Stratocruisers.

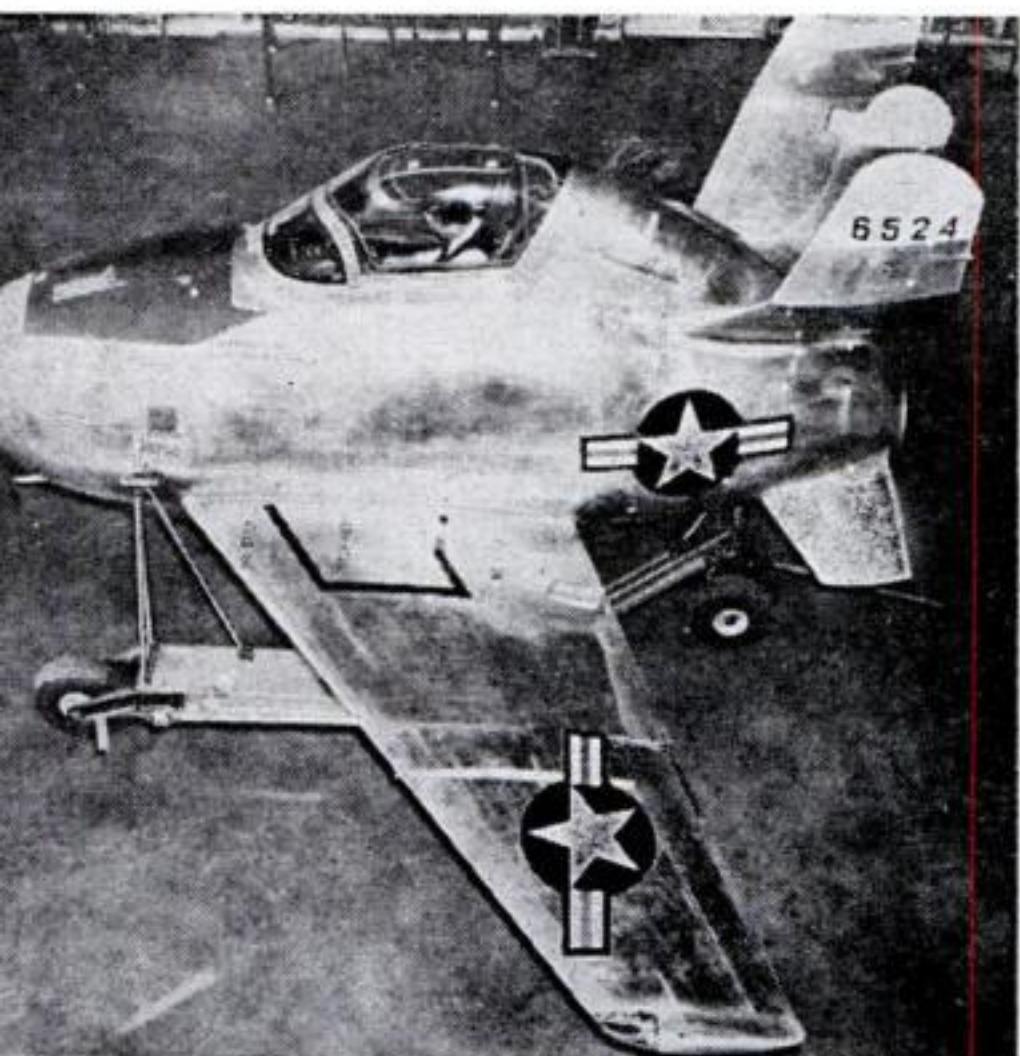


**Visible Beams Direct Landings.** Pilots really get a green light with a new Westinghouse device that guides them into an airport at the correct approach angle. As shown with model planes above, a projector throws three colored pathways into the sky. The pilot of the top plane, coming in too high, sees a yellow beam; to the lower plane, too low, the light is red. Only the center plane gets the green light. The projector uses a single 100-watt lamp, is expected to aid training and airport operation.





**Landing Skis Retract.** With these new skis on its landing wheels, a plane can sit down on snow or concrete. In flight, the skis can be retracted or lowered electrically. They've been tested successfully on a Fairchild C-82 cargo plane (photo shows device on nose wheel) by the Air Materiel Command at Wright Field, Dayton, Ohio.



**Fighter Rides in Bomb Bay.** This stubby jet plane turns big bombers into flying aircraft carriers. Called the McDonnell XP-85, it is a parasite fighter designed to be launched in mid-air from B-36 bombers. Wings, extended in flight, are folded to fit in bomb bay. Shown on a dolly, the XP-85 has no landing gear—it is to be picked up by mother plane. It's 15 ft. long, has a wing span of 21 ft., and is powered by a Westinghouse J-34 engine with a 3,000-lb. thrust. Tests are being made in a modified B-29.



**Carton Sprouts Wings.** A new package for delivering sanitation chemicals to flood-isolated communities can be dropped from a plane, as shown above, without a parachute. Upon its release, wings open out from each side. These give it a spinning motion that slows its descent. Developed by the Mathieson Alkali Works, the winged container holds six 5-lb. cans of calcium hypochlorite—enough to purify up to 2,500,000 gallons of drinking water, depending on the degree of contamination.



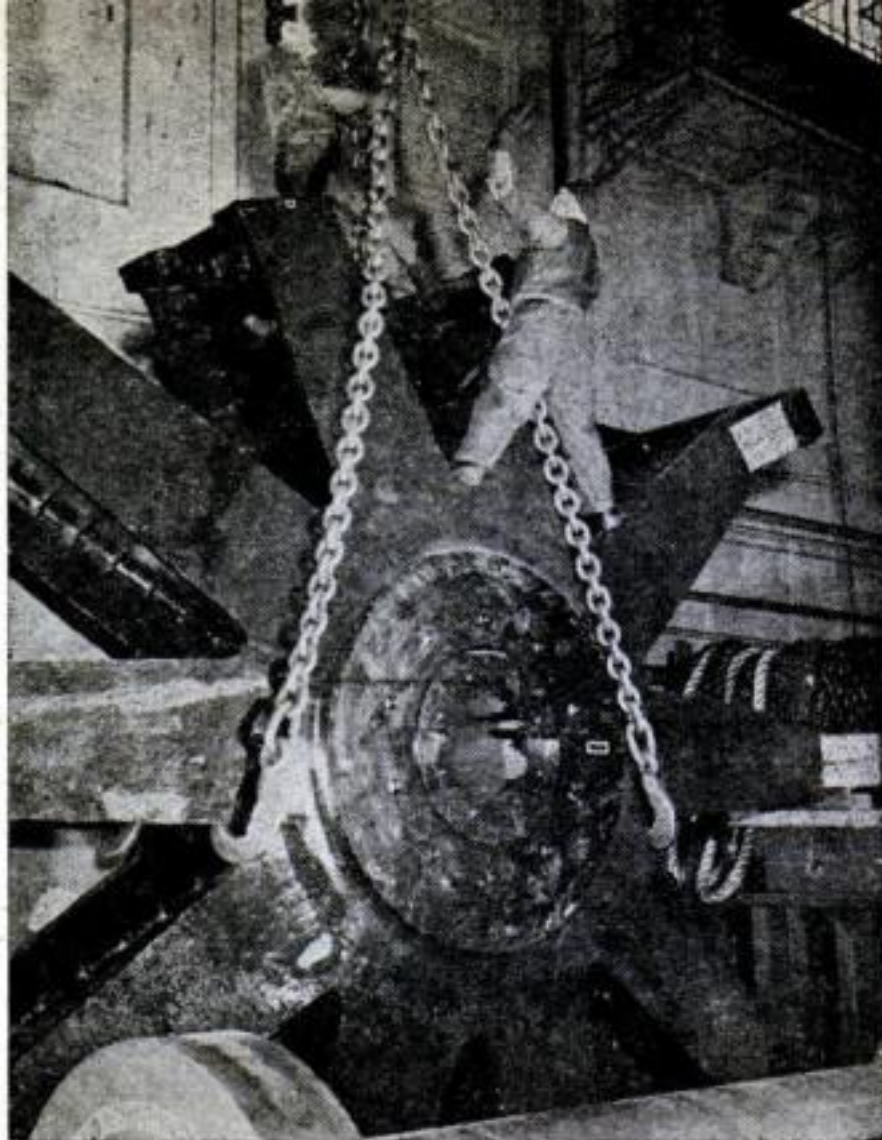
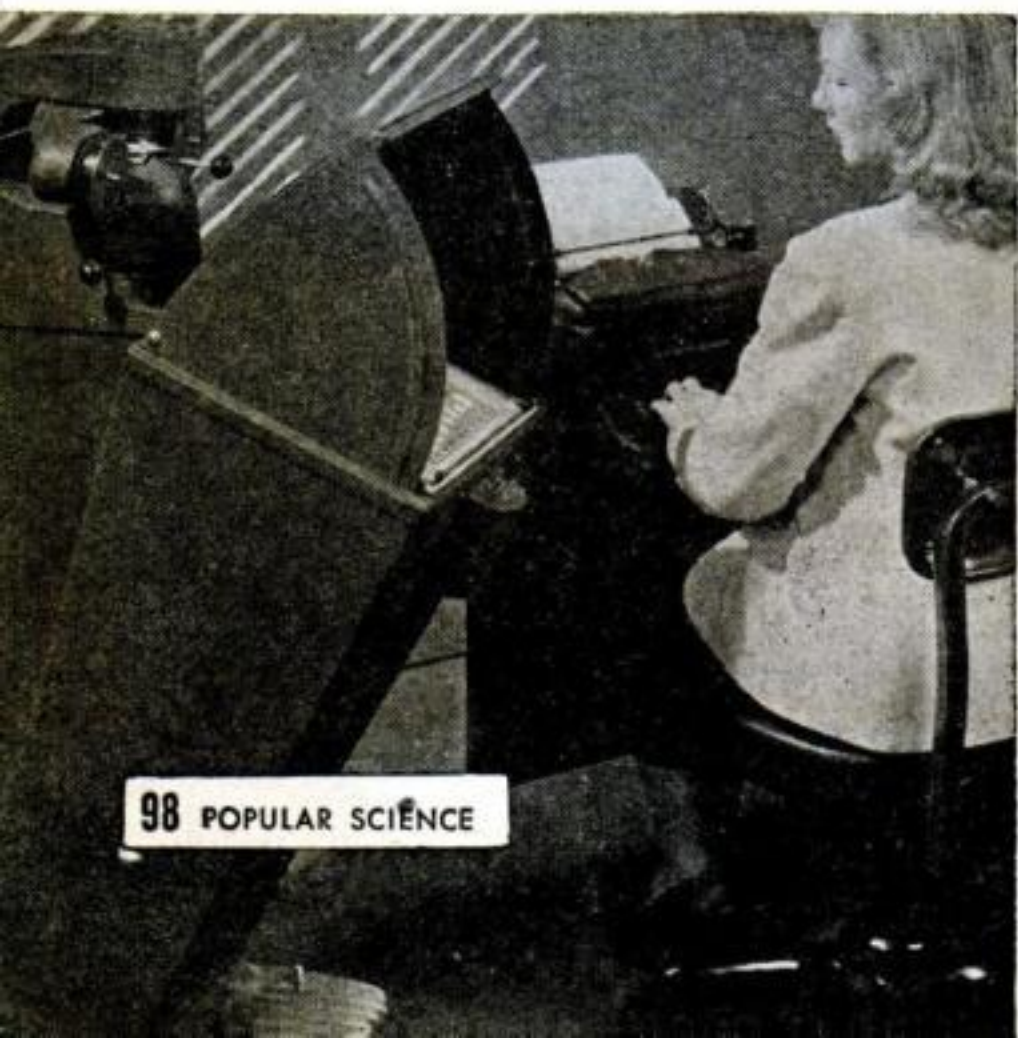


## Records Any Language

THE Palantype Ⓢ operator above can take her boss's dictation at up to 200 words a minute in any major language—and she needn't even understand the language. Similar to present stenographic machines but more versatile, the British-made device uses a phonetic system in which words are recorded by their sound instead of spelling.

## Magnifies Microfilm

MICROFILMED print as small as 36/10,000 inch high can be read easily with this projection viewer that enlarges the letters 14, 20, or 35 times their original size. Made by the American Optical Co., it has a reflectionless viewing screen and a brightness control. The device can also make photographic copies in two minutes without a darkroom.



## "Spider" Spins Power

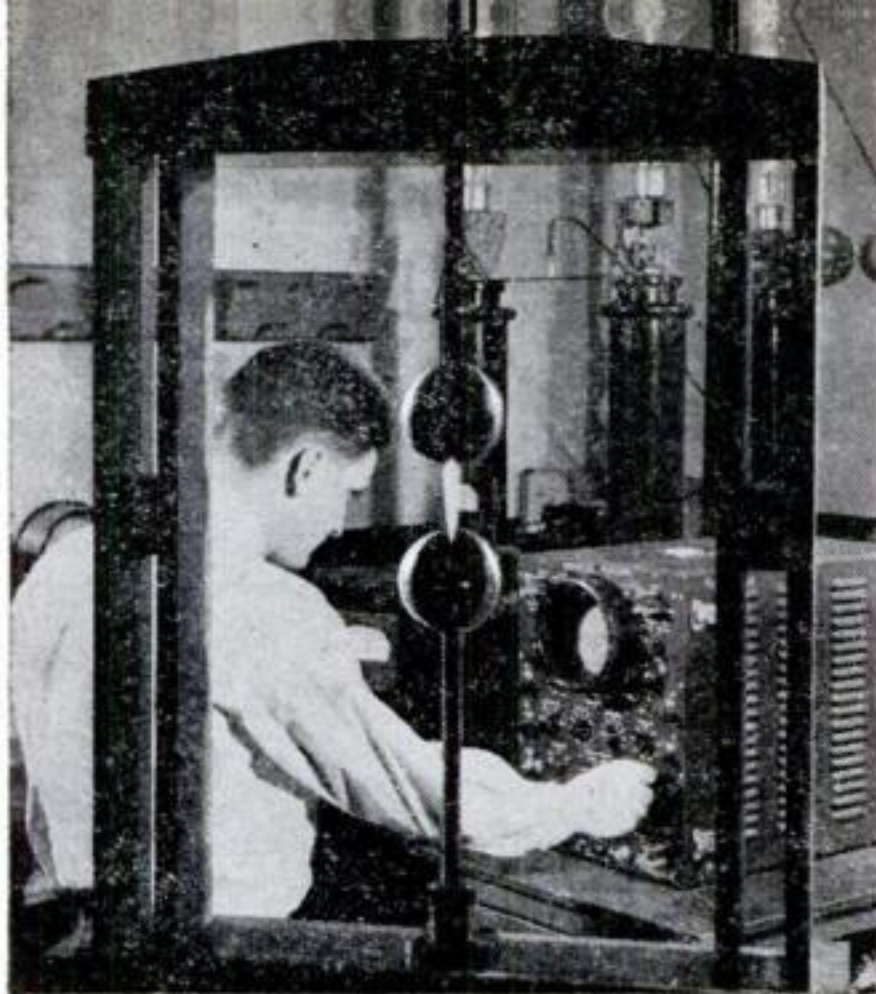
THIS 35-ton "spider" will soon be spinning out more than three million watts to help increase the electric power of the Denison Dam on the Red River near Denison, Tex. The Westinghouse giant is the central skeleton of a 250-ton rotor for a new water-wheel generator. The ends of the spider's 10 arms will whirl around at 72 m.p.h.

## Machine Shines Shoes

A ONE-MINUTE shine for both shoes is provided by these coin-operated machines made by the Kinmont Manufacturing Co., of Los Angeles. Moving buffers impregnated with wax take one shoe at a time and shine and polish it simultaneously. At the end of 30 seconds, a light flashes, indicating it is time to change to the other foot.

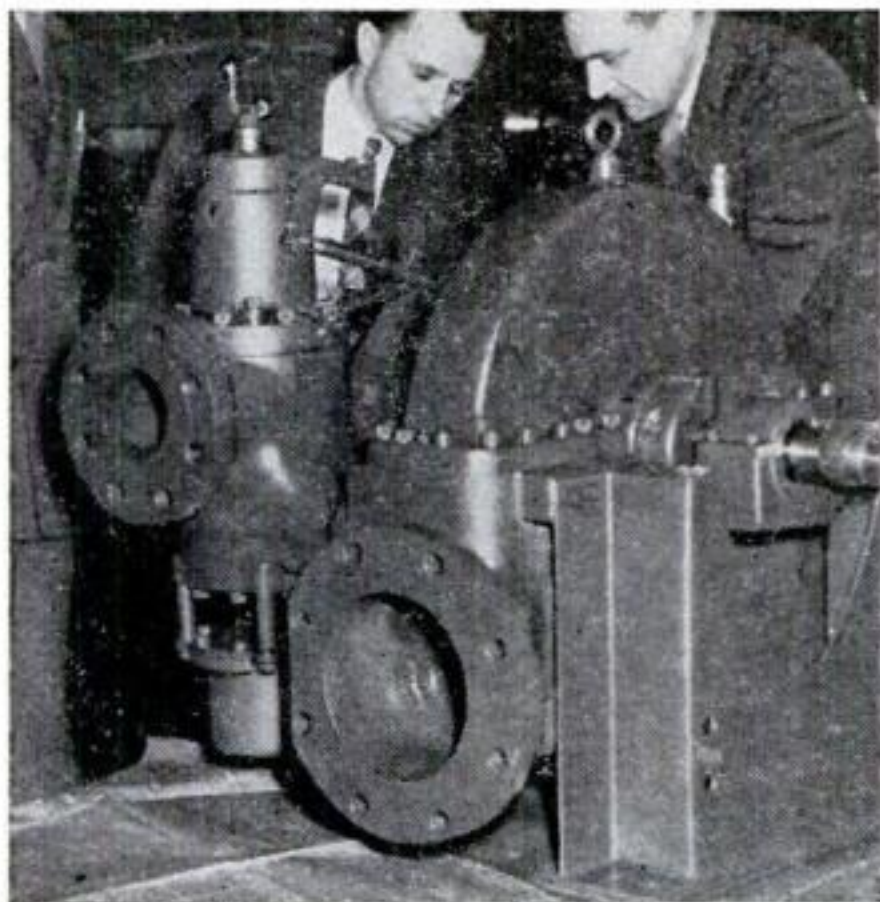






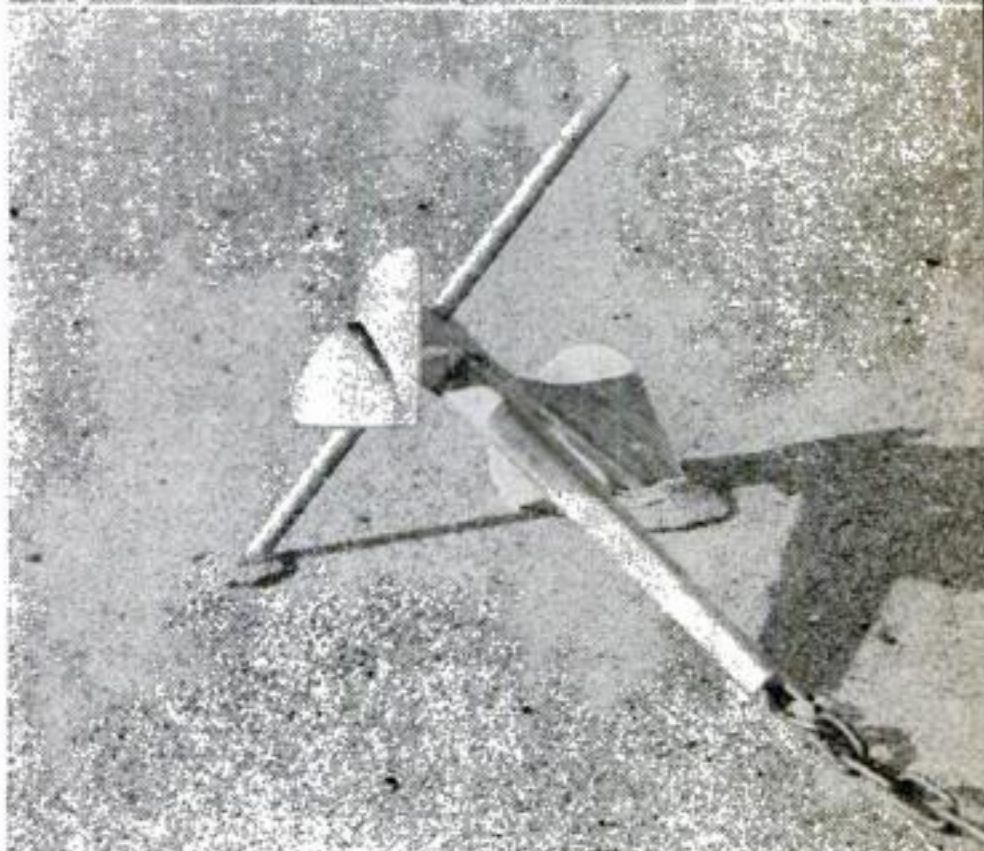
## Sparks Measure Voltage

THESE two balls, with a spark jumping between them, are the main elements of a new laboratory yardstick to measure electrical voltage. The higher the voltage—90,000 in this photo—the farther the spark will jump. Westinghouse engineers use the yardstick to test insulating material for radio, television, and power-line equipment.



## Mass-Produced Turbines

HERE'S one of a new line of GE steam turbines that are only 1/50 to 1/6,000 the size of their well-known big brothers in ships and powerhouses. Working parts of models from 10 to 1,200 hp. are standardized for mass production. They can drive pumps, compressors, fans, auxiliary power plants, and oil-field and refinery equipment.



## Anchor Buries Itself

THIS small-boat anchor depends on its shape instead of its weight. As shown above, when it hits bottom, drag turns it so that one of two plow-shaped flukes starts digging in. Within five feet, it's firmly buried. Its maker, the Northill Co., of Los Angeles, says 3-lb. model shown here will hold a 12-ft. boat in a strong wind or current.

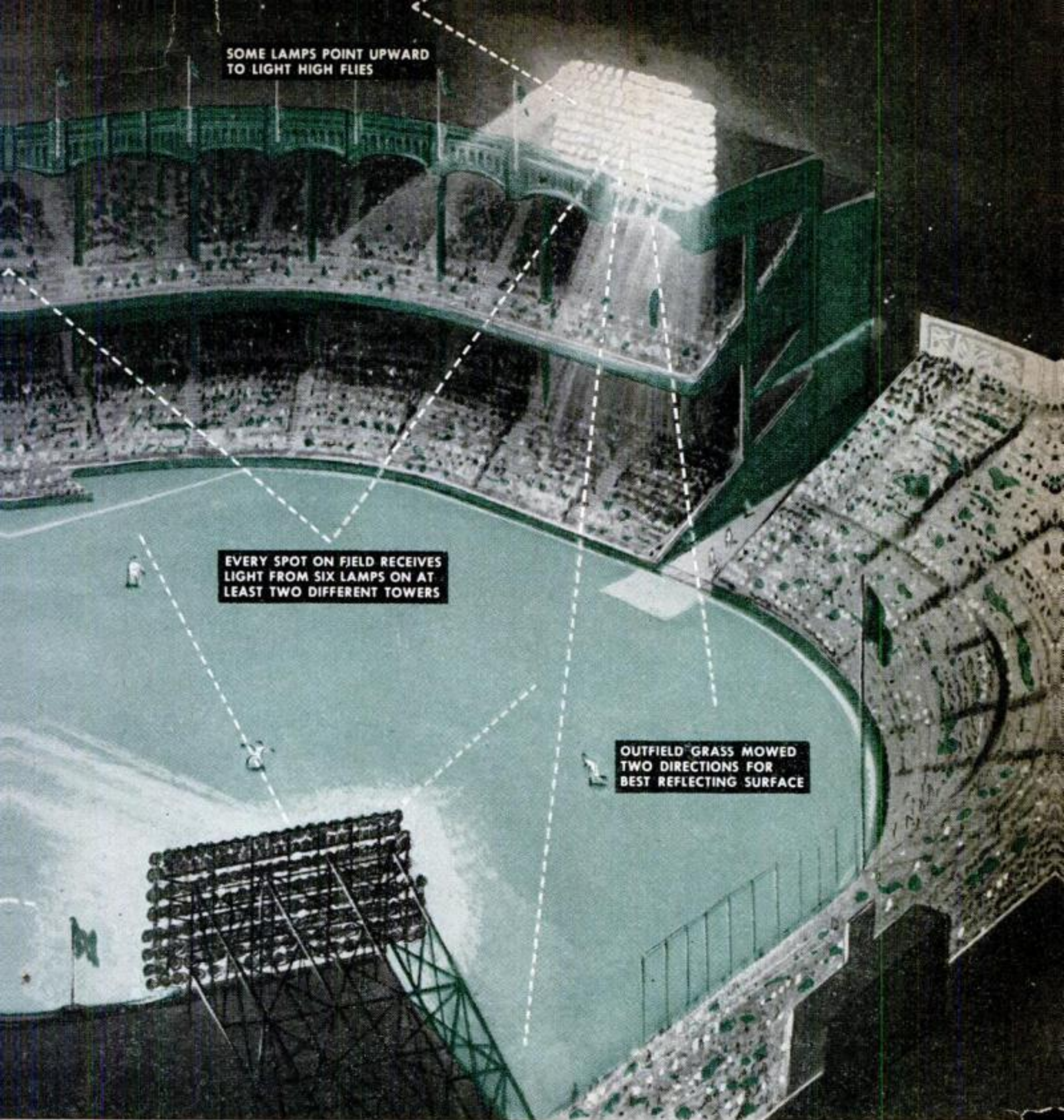




# ***Behind the Lights At a Night Ball Game***

More than a thousand lamps, each aimed before it's turned on,  
bathe the field in daytime brilliance without glare or shadows.





SOME LAMPS POINT UPWARD  
TO LIGHT HIGH FLIES

EVERY SPOT ON FIELD RECEIVES  
LIGHT FROM SIX LAMPS ON AT  
LEAST TWO DIFFERENT TOWERS

OUTFIELD GRASS MOWED  
TWO DIRECTIONS FOR  
BEST REFLECTING SURFACE

**By George H. Waltz, Jr.**

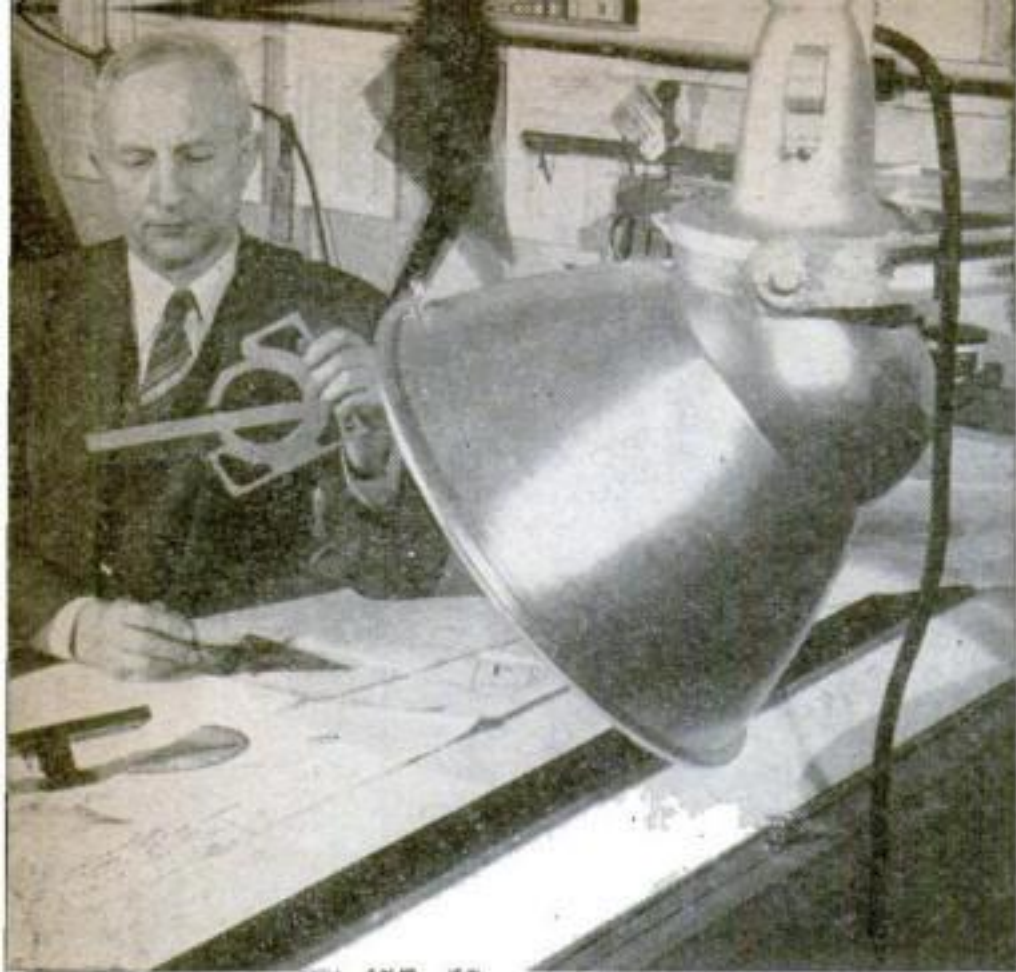
**W**HEN you go out to root for your favorite ball club in its night games this summer, there's little chance that you'll suffer the fate of the fans who braved the first after-dark baseball game ever played. That was on the night of June 2, 1883, and it was the first attempt at any kind of outdoor sports lighting. It was a nice breezy summer evening—and both spectators and players spent most of the game in the dark.

The wind kept blowing out the handful of open-face arc lamps strung around the field.

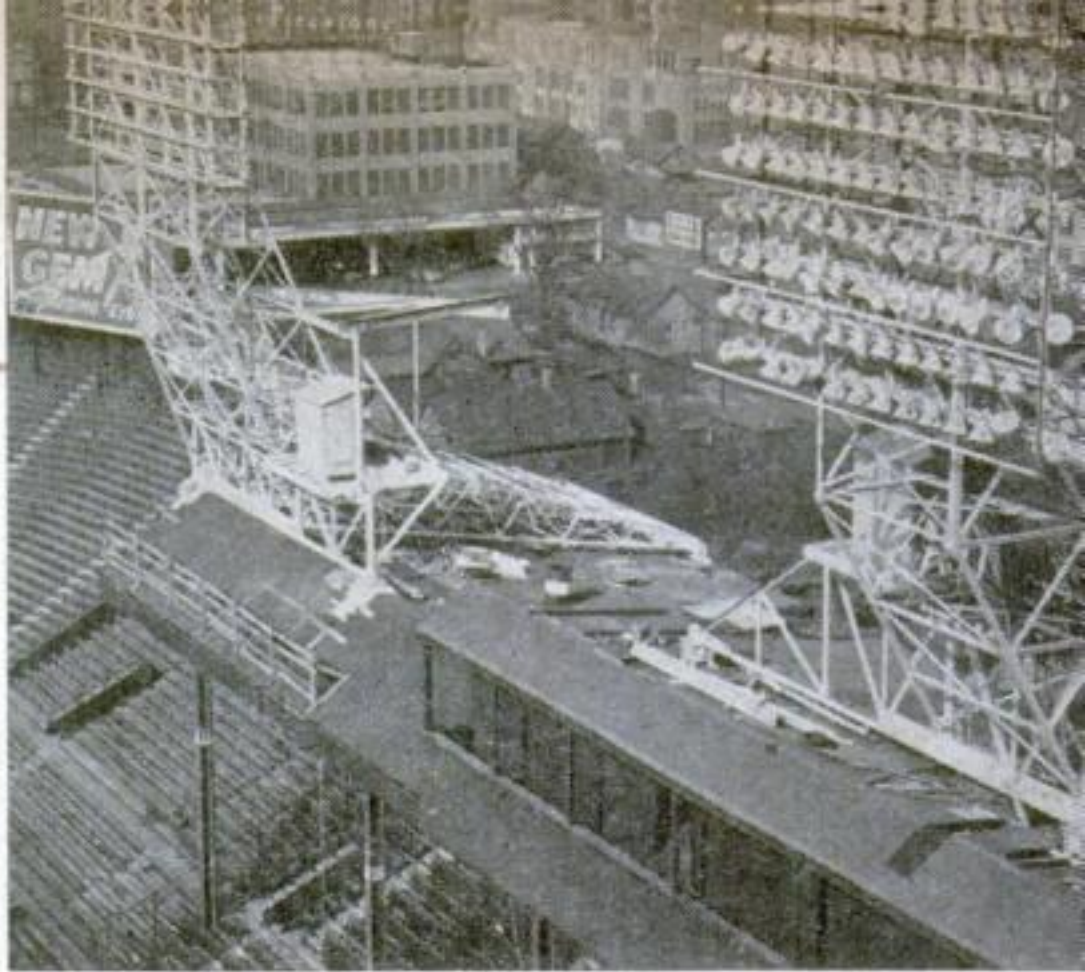
Sports lighting, thanks to the foresight of a small band of pioneers and to the public's enthusiastic response to night games, has come a long way since then.

Today, in major-league ball parks like New York's Yankee Stadium and Boston's Fenway Park, the playing field is bathed in just about ten times as much light as you get from the lamps in your living room. In the terms of the lighting engineer, that's 200





**Baseball-park lighting** project starts on the drafting board of an engineer who figures out how to aim each of more than a thousand floodlights, like one in foreground, for best results.



**Lights are supported** by seven or eight towers high above the playing field. These going up on Briggs Stadium, home of the Detroit Tigers, are part of the newest big-league installation.

foot-candles of illumination on every grain of dust and every blade of grass. The top of your living-room table probably doesn't get much more than 20 foot-candles. What's more, the baseball—no matter where, on or above the playing field, its trajectory may carry it—is always scientifically lighted to the best advantage of the player who is fielding it.

### *Lights Aimed on Paper*

But rigging a ball park for night games is no simple business of putting up enough lights of enough power. Each floodlight—and the average big-league field requires more than a thousand—must be carefully placed and aimed to add its illumination to the general lighting pattern. The job begins on an engineer's drafting table and doesn't end until the switches are thrown on the first try-out night.

Late this spring 1,386 floodlights of 1,500 watts apiece—using enough power to light a city of 10,000 people—glowed for the first time over Briggs Stadium, home field of the Detroit Tigers. More than a year ago that \$500,000 lighting project, like many another major- and minor-league ball-park lighting installation, began on the desk of John E. Brock, one of General Electric's sports-lighting experts. With slide rule, protractor, stadium blueprints—and a good deal of past experience—he calculated just where each of the 1,386 individual flood-

lamps should be placed and aimed to provide shadowless illumination for players as well as spectators.

His problem can be compared with trying to cover a green table with cardboard ovals by placing them so that none of the green can show through. His answer was a series of aiming charts, one for each of the stadium's eight lighting towers. These charts gave the aiming angle for each lamp—the number of degrees it should be turned to right or left, up or down. Workmen, by setting calibrated dials on the floodlight mounting, could then adjust it precisely to the lighting engineer's carefully calculated specifications.

This method allows the lights to be aimed in the daytime. In most cases, the engineer's initial calculations are so accurate that it isn't necessary to re-aim a single lamp when the floodlights are turned on after dark.

Pre-aimed lights were first used in Yankee Stadium in 1946. They have since been installed in Fenway Park and Cincinnati's Crosley Field, as well as in Briggs Stadium, and are being used in practically all General Electric's new and revamped installations throughout organized baseball. The lamps, made of specially processed aluminum, weigh only 18½ lb. apiece. Their cover glass can withstand the hardest line drive; fast-ball pitchers have tried—and failed—to break it at a range of ten feet.





**Conduits shield cables** that carry current to the individual lamps. The Briggs Stadium lights use, all together, 2,416,000 watts of power—enough to light a city of 10,000 people.

When closed, the floodlight unit is sealed tight against rain, soot, and insects; yet the lamp can be replaced simply by unlocking and removing the socket, without disturbing the aim setting.

#### *What to Watch For*

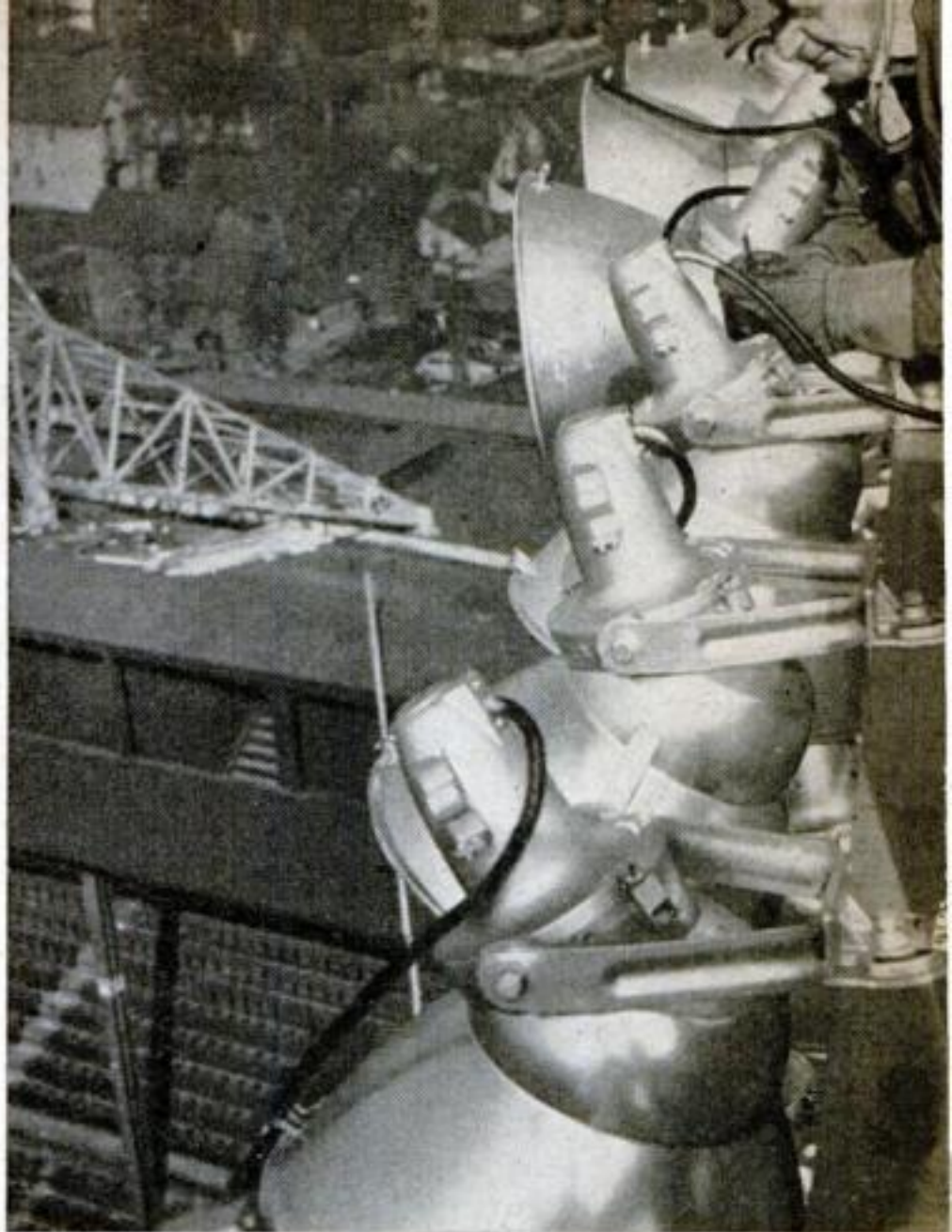
Next time you go to a night ball game, take a good look at the lighted surface of the playing field, watch the ball closely in its flight, and notice the location of the tall towers that support the floodlights:

Any one spot that you may pick out on the field is receiving its light from six different floodlights on at least two different towers. That eliminates shadows.

No matter where the ball is, it's always lighted on the side toward the player who has to field it. That's why some of those lights point up instead of down; if all pointed down, a high pop fly might get out of the field of illumination.

Not one of the towers is in a direct line with any of the principal lines of play—the baselines, the line from first to third, and from second to home. That eliminates the possibility of blinding a player with too much light from one source.

Finally, when the game is over and you can walk out on the field, examine the grass in the outfield: It has been mowed in a special way to provide the best possible reflecting surface for the overhead lights. This trick was discovered back in 1930,



Lights are aimed to left or right as each is attached to steel girder by a single bolt. Up-or-down aiming follows. Both adjustments are made in daytime before the lights are turned on.

**Calibrated dials** on the mounting make aiming easy. Installer simply adjusts lamp vertically and horizontally to dial settings given on aiming chart, then locks the mounting in that position.





when the third modern baseball lighting installation was completed at Perry Stadium in Indianapolis. On opening night, what appeared to be a huge shadow covered deep right field. After the game, the lighting engineers discovered the cause: since the grass had been mowed in one direction only, most of the blades had been bent into a position in which they offered a poor reflecting surface to most of the light hitting that part of the field. Now ball-park grass is mowed in two directions along concentric arcs fanning out from home plate.

Outdoor lighting, and the popularity of night baseball, came to us via railroad. In the early 1920s railroad officials decided to floodlight their yards to permit 'round-the-clock operations. This work gave Robert J. Swackhamer, a General Electric lighting man, a chance to test high-level lighting. In 1927 he convinced his bosses that it could be applied to sports lighting, and they let him rig the company baseball diamond at Lynn, Mass., for a night game. Seventy-two floodlamps lighted a game between Lynn and Salem on the night of June 24, 1927.

### *Pro Teams Adopt Lights*

The first professional night game was played at Des Moines, Ia., on May 2, 1930. Two seasons later Larry MacPhail, then general manager of the Columbus Red Birds in the American Association, installed high-level lighting in their stadium. In 1935, as general manager of the Cincinnati Reds, he introduced night baseball to the major leagues. Later, as president of the Brooklyn Dodgers and then of the New York Yankees,

he put lights in Ebbets Field and Yankee Stadium. Now only one major-league team, the Chicago Cubs, is without lights in its home park.

In 1935 MacPhail's Reds played seven league games under lights at Crosley Field. This year Cincinnati alone will play 36 night games; all major-league teams together will play a total of 357—163 in the National League, 194 in the American. Almost all minor-league games this season are being played under floodlights.

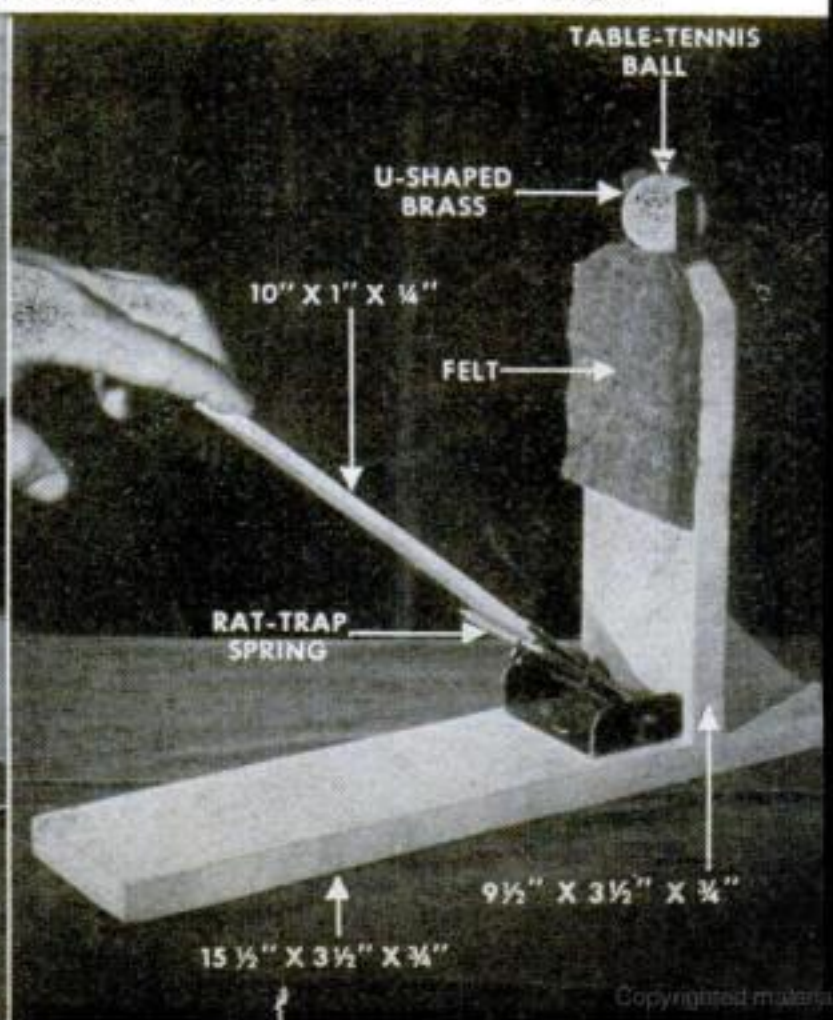
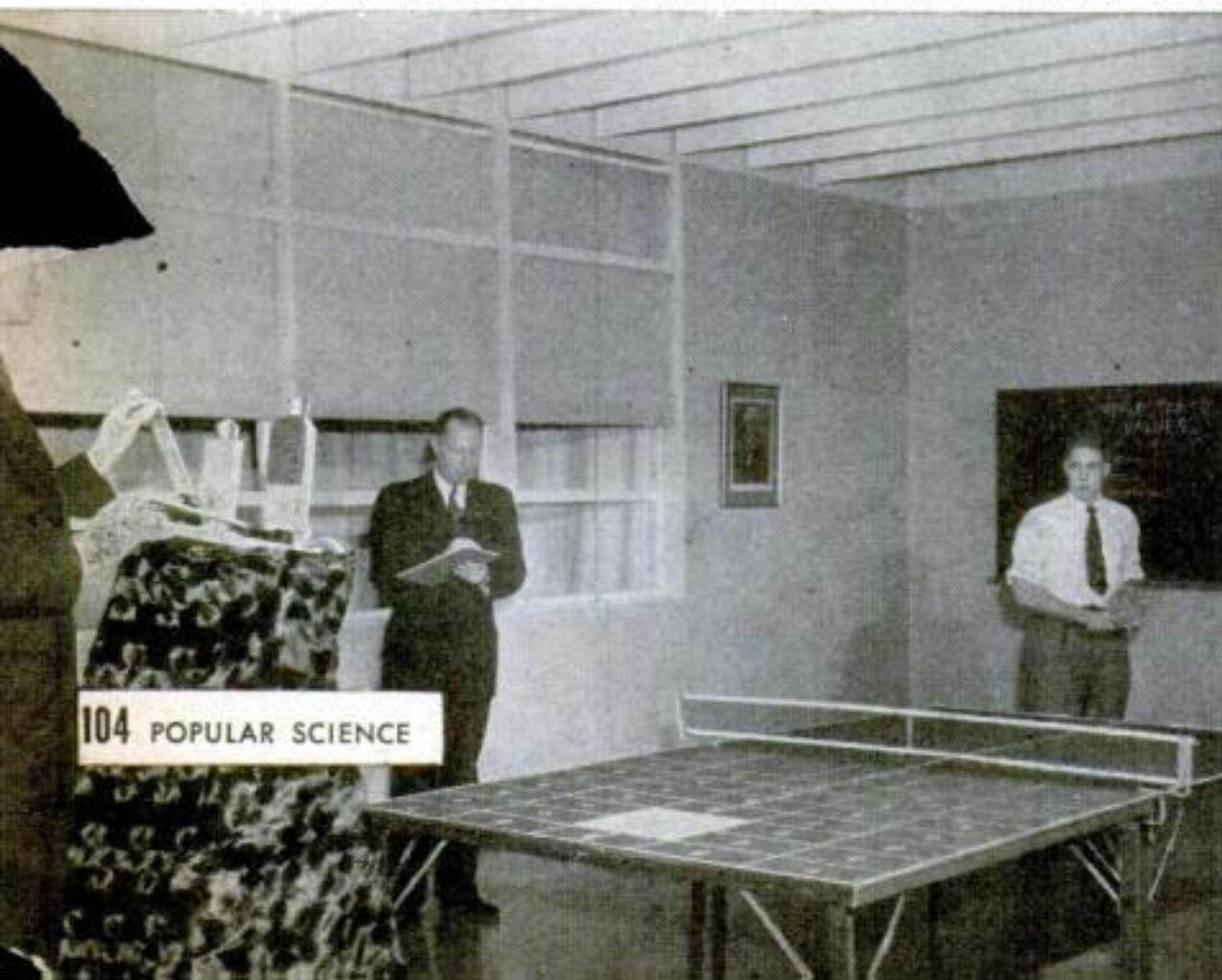
### *Lighting Other Sports*

And sports lighting, by turning night into day so that Americans can take their fun when they have the most free time, has spread far beyond the baseball parks. Lights now are being used for almost every outdoor sport from archery to volley ball. Softball, thanks to floodlights, is running a close second to bowling in number of participants. The police of Milwaukee say lighting its tennis courts and public playgrounds has cut petty crime, vandalism, juvenile delinquency—even night traffic accidents.

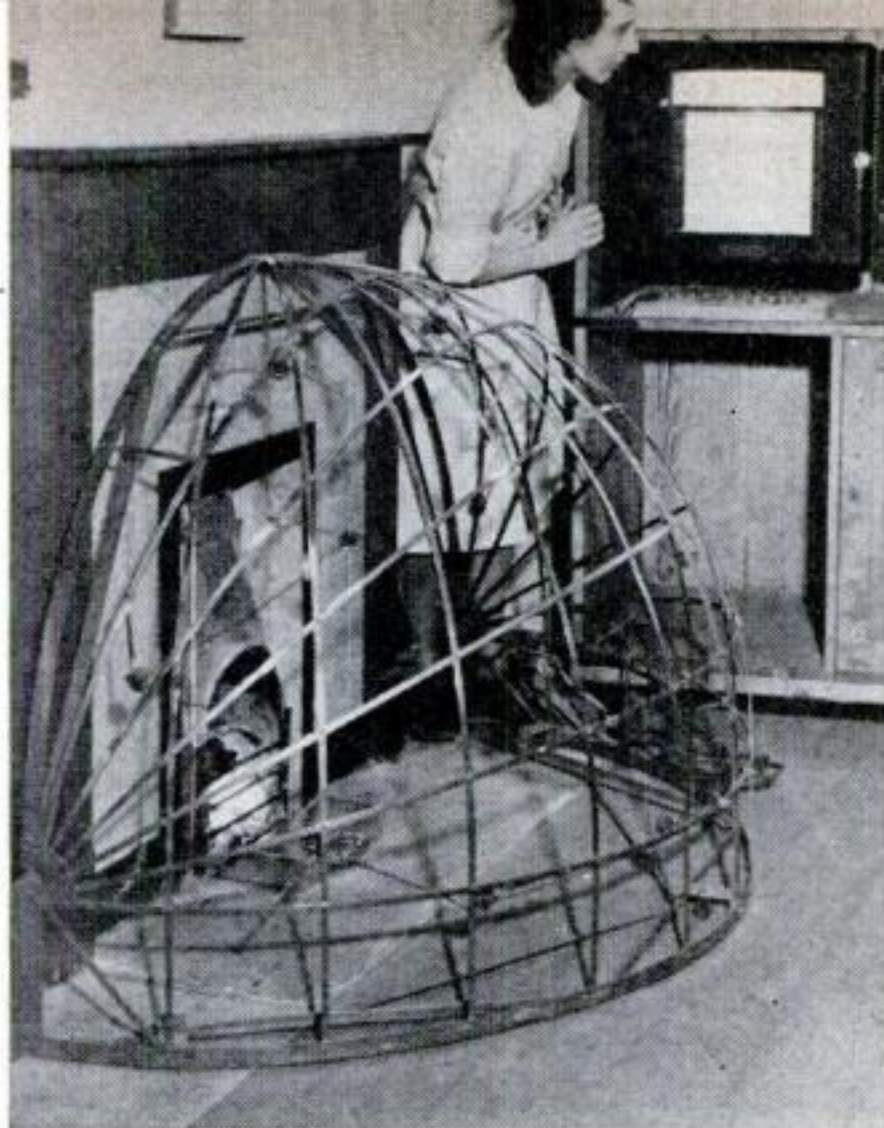
Lighting engineers are also working on better illumination for indoor sports. The pictures below show a laboratory and apparatus used at General Electric's Nela Park in Cleveland to find out how much light you need for table tennis. The answer—20 foot-candles for normal rumpus-room games, 50 for fast tournament play—may interest you less than the researchers' discovery that practice in returning smash serves from the easy-to-make ball projector improved their games. END

**Best lighting for table tennis** was determined by experiments of General Electric engineers in which they scored skilled players on their

ability to return smash shots from a spring-powered ball projector (right, below) that shoots balls across net at speed of 40 m.p.h.





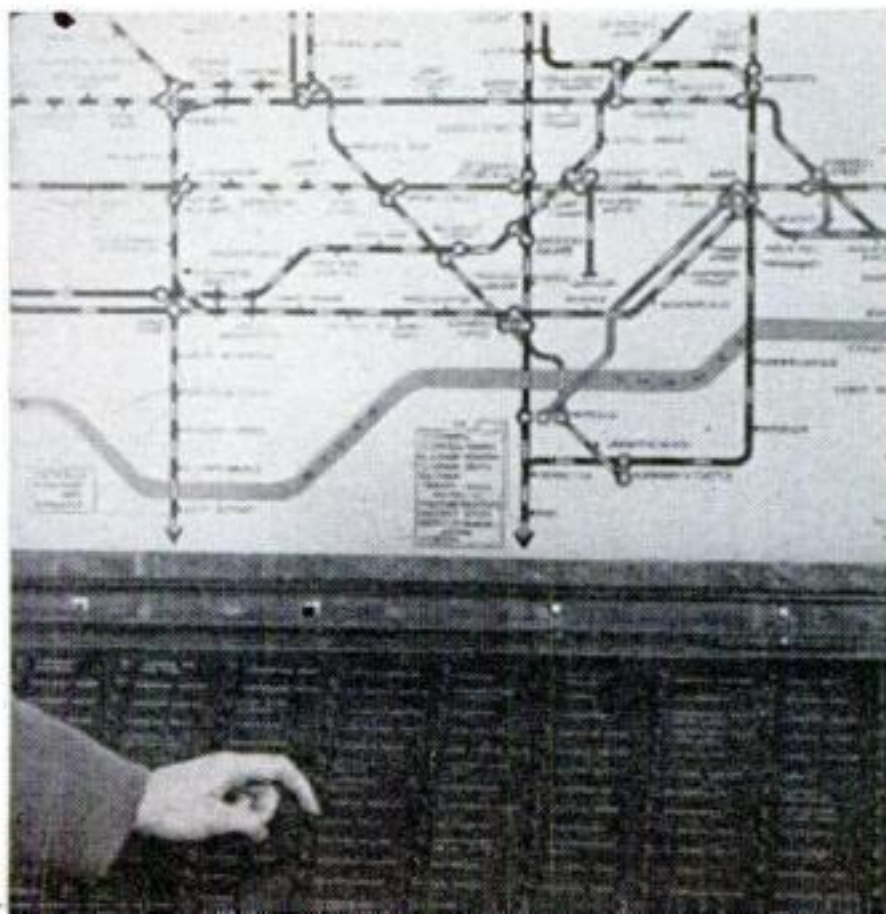


## Cage Tests Grates

THIS screen can stand in front of a fire and tell you how much heat it throws out. Thermocouples on the frame register the answer on meters in background. Fuel-conscious Britons developed the tester to help get the most heat from the least coal.

## Subway Guide Lights Up

A NEW pathfinder for subway travelers, shown below, operates on the principle that the quickest route is—literally—the line of least resistance. The resistance is that in strings of neon lights along alternate routes between any two stations on the map. When buttons are pushed for starting point and destination, an electric current selects the connecting circuit with fewest neons, and thus lights up the quickest route. The system, developed by Sperry, Ltd., was tested in London's subway.



## Movie Camera Dances

A LIGHT camera carriage, strapped to the male partner of a movie dance team, now keeps the actors in focus as they glide about a ballroom floor. Device was first used to film Ava Gardner and Robert Walker (above) in "One Touch of Venus."

## Garden Grows on a Wall

HERE'S how a California gardener (below) turned his strawberry patch on its side. Henry Hayward, of San Fernando, set 350 plants into the hollow sections of cement blocks that form two parallel walls 13½ feet long, 6 feet high, and 6 inches apart. The roots grow in fertilized soil that fills the space between the walls, and are watered from the top by a pipe with holes drilled through its under side. The patch needs little other care, Hayward says—and no weeding at all.







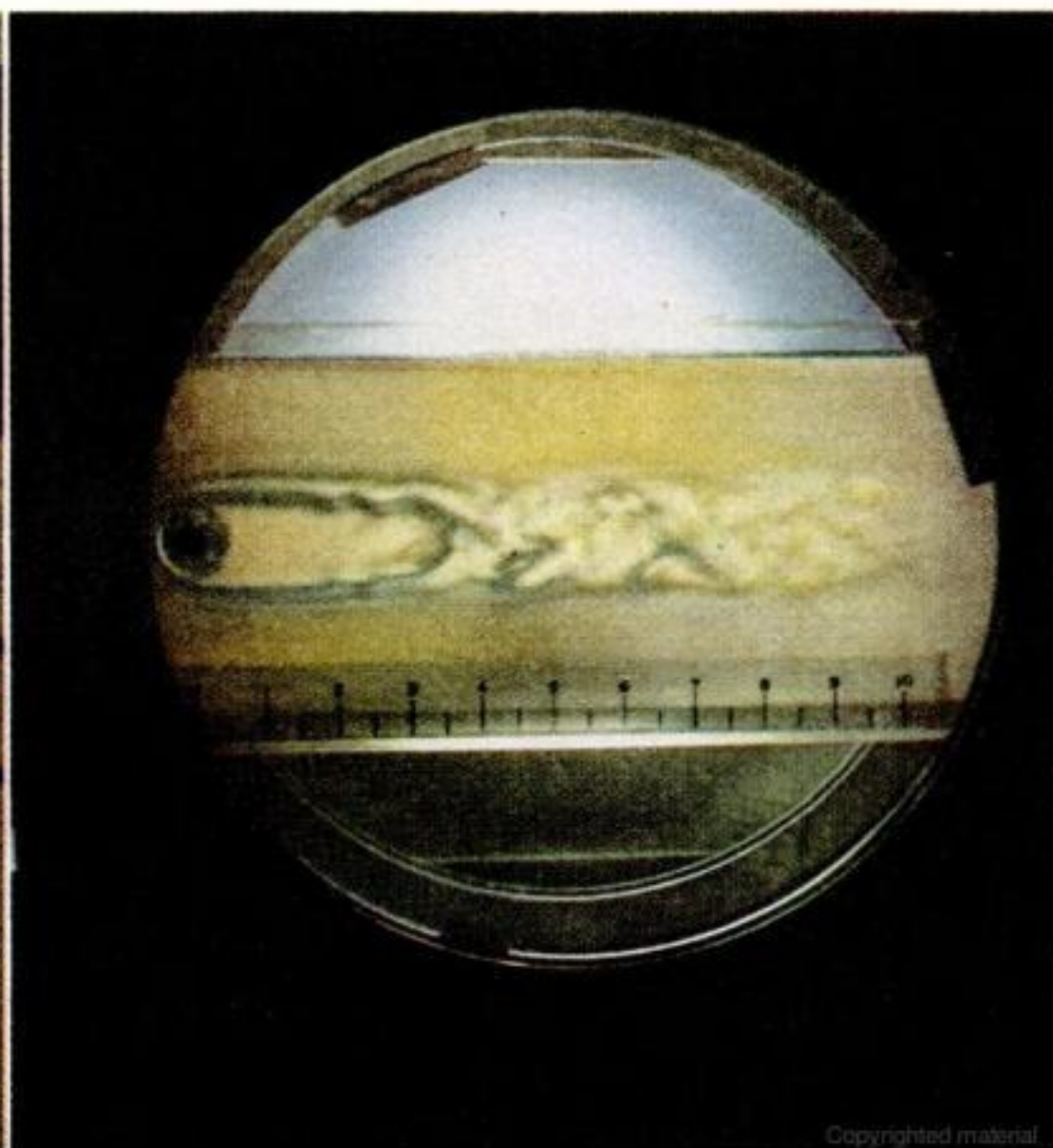
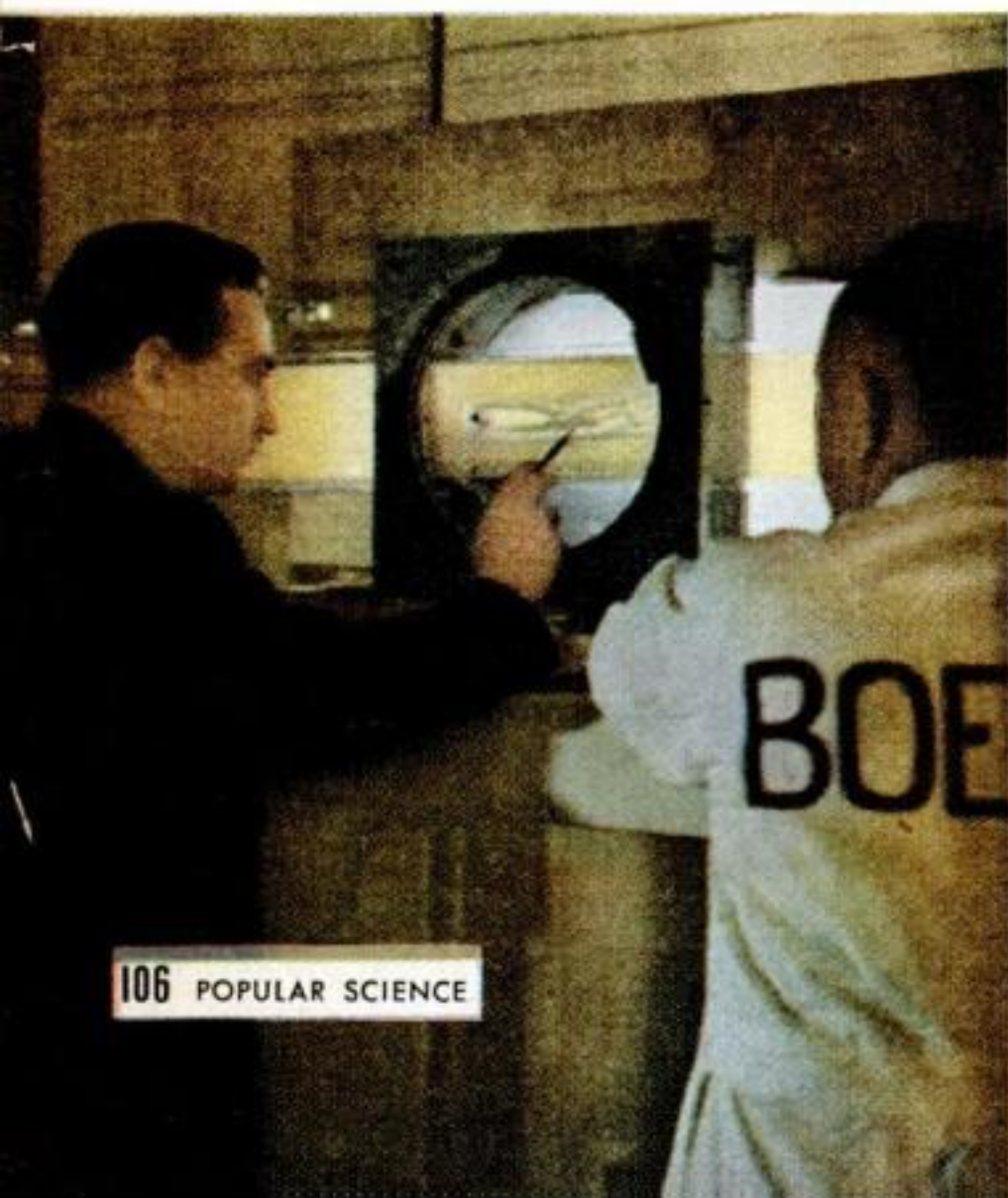
## MARCH OF SCIENCE



**Predicts Position of Moon.** Want to know where the moon will be at midnight on July 4, 2148? That's child's play for the world's smartest "electrical brain." This 12,500-tube super-calculator, built by International Business Machines, is compiling tables that tell the moon's position at any date and hour. Computing a single position, a day's work for a mathematical wizard, calls for 19,390 additions, subtractions, and multiplications of terms like "0.00001 10108 sin (0.53734 104-0.00001 01044 17 t + 0.00000 00000 00025 60 t<sup>2</sup>)." The machine does it in seven minutes. In composite photo, left, moon pictures symbolize problem that girl at controls is feeding into "brain." Answers are punched on cards, which a card-operated electric typewriter translates into numbers.

**Wet "Wind" Tunnel.** If airplane designers could "see the spray" of their products speeding through the air, a famous builder once remarked, there would be many changes for the better. By using water instead of air to test models, Boeing engineers now make "seeing the spray" a reality. High-speed air flowing past objects is simulated by a slower-moving current of water, in a wet "wind" tunnel measuring four feet long, five inches high, and one-half inch wide. Microscopic particles of bentonite

clay suspended in the water impart to it a special refractive power. When the test chamber is illuminated by polarized light and viewed through a suitable screen, flow lines and eddies leap into view as brilliant patterns of blue, green, yellow, and orange hues. Observations of this "spray" have already proved useful in designing burners for ram jets, and wider applications are foreseen. At left, below, experts study the turbulence set up by a cylinder, shown in close-up at lower right.







**Artificial Raindrop.** This plastic model of a raindrop effectively imitates a real one—and will hold still. It serves Westinghouse engineers as a target for ultra-short-wave radar in experiments to find out why rain upsets reception of signals.



**Unspared Rod.** Stretched at 1,000° F. by 6,000 lb. since a month before Pearl Harbor, this much-abused rod will next be strained until it breaks. The drastic tests tell GE engineers how molybdenum-vanadium steel will stand up in turbine parts.

**Soil Preserved Intact.** To take home loose soil for study, University of Wisconsin geologists have devised the technique shown from left to right below. They drive

angle-iron frame into exposed bank, close it with plank, lay tray of soil flat, and apply Vinylite ® resin. When this liquid hardens, permanent specimens are obtained.







Long, sweeping strokes with mitten's palm cover large areas; thumb gets hard-to-reach spots.



**Before.** It took two days of cleaning, sanding, and patching to get the author's '39 Olds ready for the big moment. A dull, dark gray before, it had soon become a deep, rich, shiny maroon.



**After.** Here is the same car just four hours later. Shown with only first coat of paint, it had already taken on new life and luster. A second coat, plus polishing, completed the job.



# ***I Painted My Car With a Mitten***

**By W. W. Morris**

*Chief Photographer, Popular Science Staff*

**P**AINTING anything more than a screen door has been strictly a spectator sport for me. I felt about painting a car the way I felt about working with plate glass—it was all right for the experts, but not for me. I would stick to taking pictures of somebody else taking the risk.

A mitten, however, made me an expert. Without brush or spray gun, I painted my car successfully. The mitten that made this possible was part of a kit put out by the Arco Company, of Cleveland. Called Pad-O'-Paint®<sup>®</sup>, the kit contained everything from the paint and mitten applicator to sandpaper and patching filler—even cleaning cloths, putty knife, and a small paint brush. It was supposed to do as good a job as a regular paintshop. All I had to do was supply the car—and the muscle.

I decided to experiment first on something less fatal than the family car. I had an old, beat-up photo reflector, so I mitten-painted that. It looked good. I was encouraged. Then I sandpapered a spot on one of the fenders of my '39 Oldsmobile and proceeded to mitten-paint that.

Doubt dies hard. I kept plenty of benzine handy to wash the paint off if the spot

didn't look right when I got through. In a couple of hours the paint was dry. The spot didn't look bad.

"Okay," I thought, "I'll give it a try."

First I had the job of cleaning the car. Here I departed from the printed instructions in the kit, which advised the use of dry sandpaper. In talking with the men in the POPULAR SCIENCE home workshop department, I learned that it would be easier to do the job with wet sandpaper. I did most of this under running water. In addition to the two grades of sandpaper that came with the kit, I used #120 (coarse), #360 (medium), and #500 (fine). This was necessary to get all the stains off the old finish and smooth it down for the new one. Where rust showed, I had to sand down to the metal. This took two days.

After that, I followed the directions exactly. Small dents and holes were leveled with the plastic filler supplied with the kit. I used a solvent cleaner to remove the nine years of accumulated wax and grime. This also came with the kit. So did a lint remover that I used just before painting.

"This had better work," I said to myself as I remembered the weekend just spent getting the car ready. Feeling like a paratrooper on his first jump, I made a bold swipe at the top, where the instructions



Everything but the muscle. Besides mitten applicator, Pad-O'-Paint®<sup>®</sup> kit included solvent cleaner, plastic filler, paint tray, cleaning cloths, sandpaper, putty knife, and a small paint brush.



After thorough washing, entire car was carefully sanded—down to metal where old paint was worn or rust had formed. Waterproof sandpaper was kept soaked under stream from hose.





**Small dents, holes, and scratches** were patched with the plastic filler, worked in and smoothed with a putty knife. These, too, had to be carefully sanded after the patching filler hardened.

said to start and where, incidentally, I figured only the birds would notice if something went wrong.

But the paint went on nicely. Using long, even strokes with the palm of the mitt, I covered the large spaces quickly and, by maneuvering right, avoided streaks and overlaps. With the small dauber on the thumb, I was able to paint up close to the trim and get at the hidden, hard-to-reach places. And in even tighter squeezes, I used the kit's small paint brush. Another handy gimmick was the circular tray that fitted into the paint can. Resting on a coil spring, it made it easy to get the right amount of paint on the mitten at any level in the can.

Now I know I can paint a car. There was only one trouble, and that wasn't with the paint. Every now and then I had to stop to take some pictures. These were in color, and the car had to be placed in the sun for the proper light. That made the paint dry a little too fast, and I got a faintly streaked look here and there. But a second coat, for which the kit provided an ample supply, took care of that.

The whole paint job took about four hours. Add in the two days of sanding down, and I figure I got a paint job for less than \$10, plus a busy weekend. This means I saved around \$60 over neighborhood repaint prices, to say nothing of the \$100 to \$150 added to the car's trade-in value—pretty good pay for two or three days' work.

END

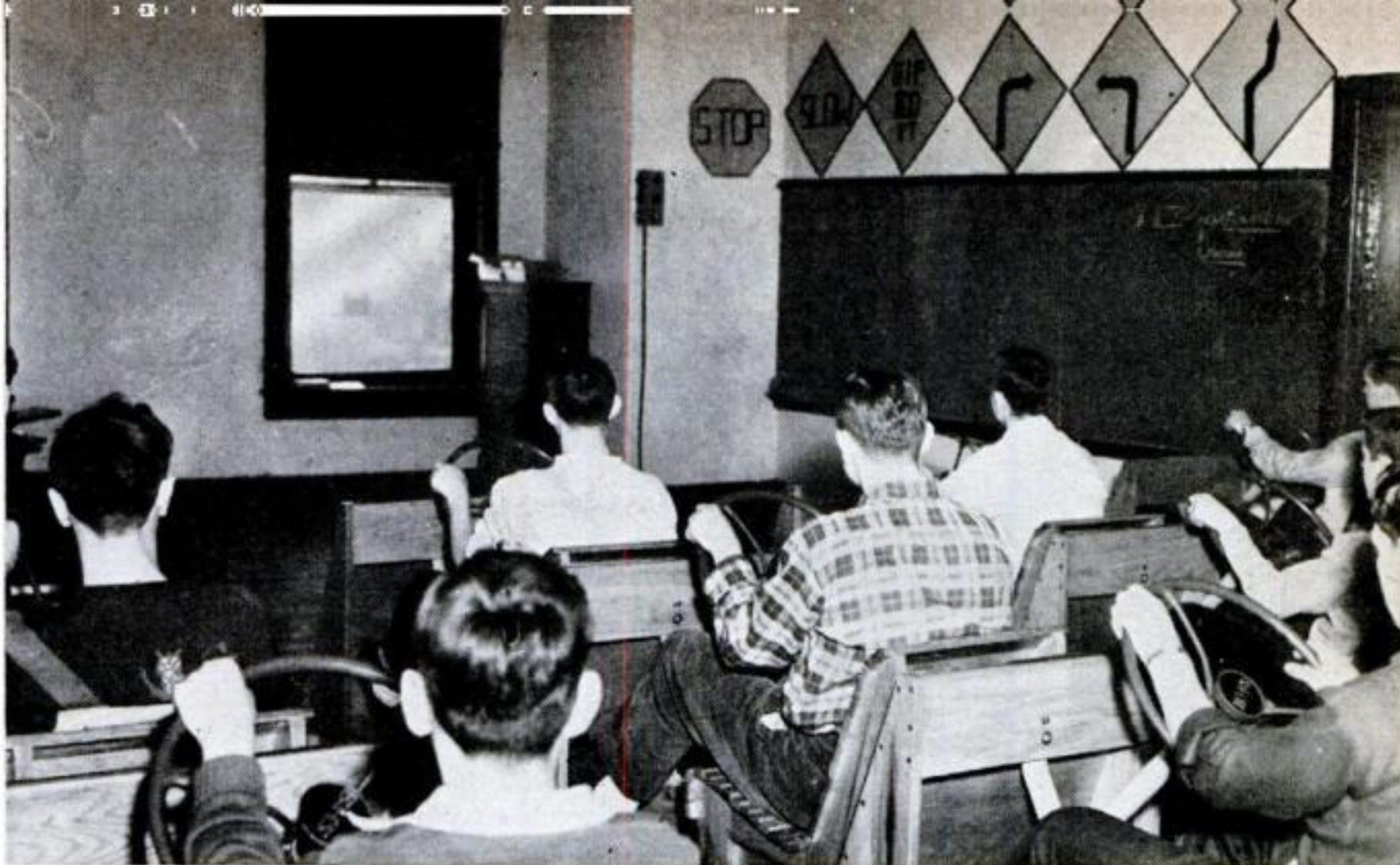


**Solvent cleaner** dissolved old wax, grease, and imbedded grime. Just before paint was applied, car was given last-minute rubbing with a special cloth provided for removing dust and lint.



**Starting at the top**, right half was done first, then left. Then came back, rear fenders, sides, hood, and front fenders. Paint was smeared on, then stroked smooth, was dry in 1½ to 2 hours.





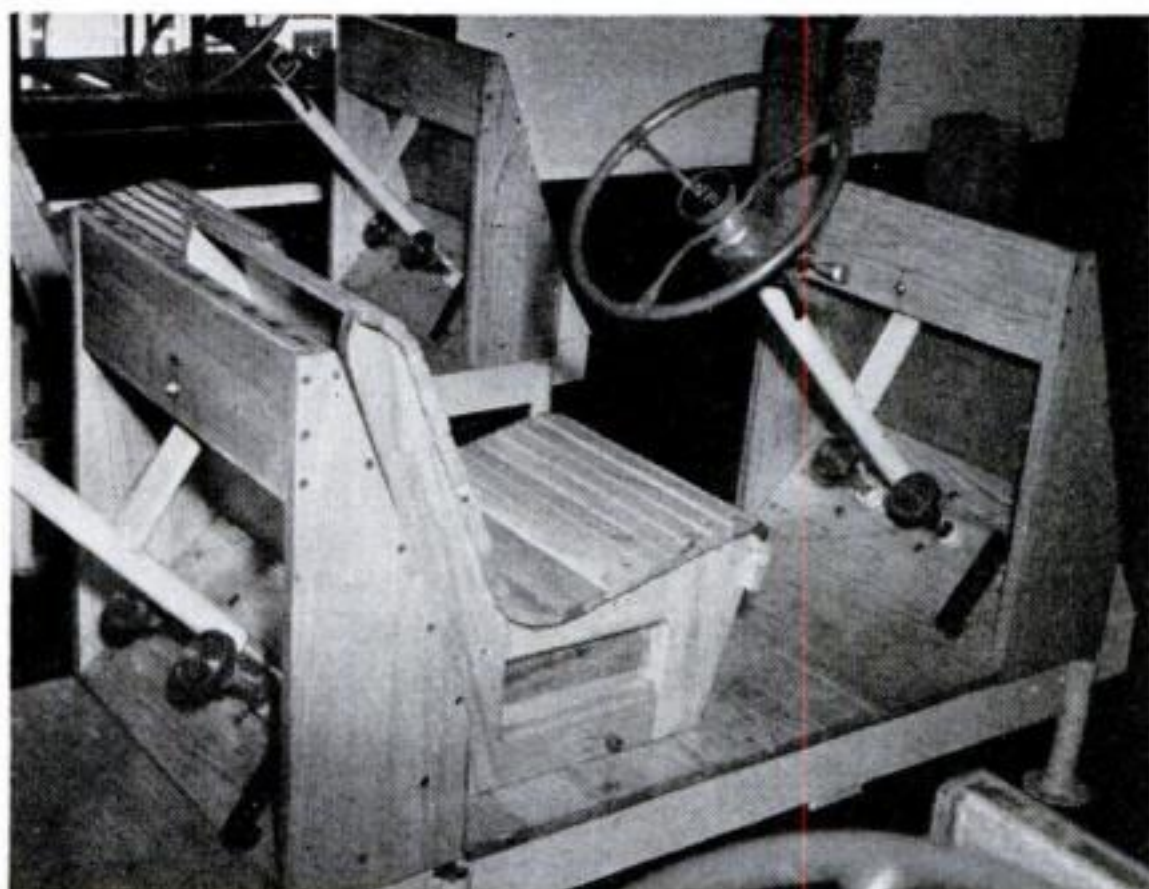
Students seated in driving units watch traffic light, left of stop sign, on classroom wall.

## ***Motoring Taught Like Flying***

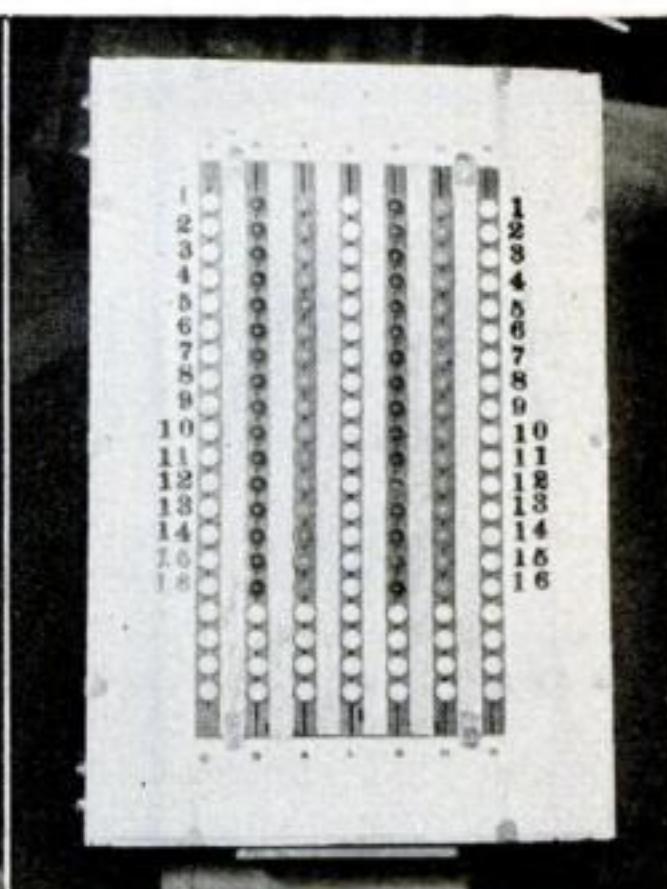
**H**IGH-SCHOOL students built these working mockups of automobile driver's seats to practice driving without risking their necks. Sixteen of the units, complete with controls, are now being used at Bloomington, Ind., to teach driving the way aviation cadets learn flying in Link trainers. All the parts, except the steering wheels and rubber pedal pads, were made in the

school's shop classes at a total cost of \$500.

Two hundred and fifty students take a one-semester course in the trainers before going outside for practice in a dual-control car. The final exam is an imaginary tour of Bloomington, on which the teacher describes actual traffic situations and checks the speed and accuracy of the students' response as flashed on a control panel. **END**



**Driving unit** has usual hand and foot controls. Response with them to traffic situations registers in colored lights on panel at right. Numbers indicate the 16 units; letters, the controls:



C for clutch, B for brake, A for accelerator, L for low gear, S for second, H for high, R for reverse. Panel, made from an old telephone switchboard, can accommodate four more units.





**Test by fire** compares resistance of Kaylo ® door, left, and standard wooden door. This view

is from exterior. Time elapsed after fire was lit is shown on this picture and the series at the right.

# New Door Resists Fire

**T**HIS door may some day stand between you and death. How it can be used to safeguard apartment dwellers and hotel guests against flames sweeping through corridors is strikingly shown in the test above.

The new door, moderately priced, has been given a one-hour fire rating by the Underwriters' Laboratories. That means it has withstood 60 minutes' exposure to a temperature of 1,700° F., plus a one-minute battering from the stream of a fire hose. For a person trapped in a room of a burning

building, the door will be a solid bulwark against flames and suffocating gases until firemen come to his rescue. Its inner side won't even get hot—just warm.

Outwardly the wood-veneered door resembles any other. Its secret lies in a grayish-white core of cellular, noncombustible material, made from lime, silica, and asbestos, which was first developed to serve as heat-insulating lagging for boilers and steam pipes. By a slight modification of the original manufacturing process, the Amer-

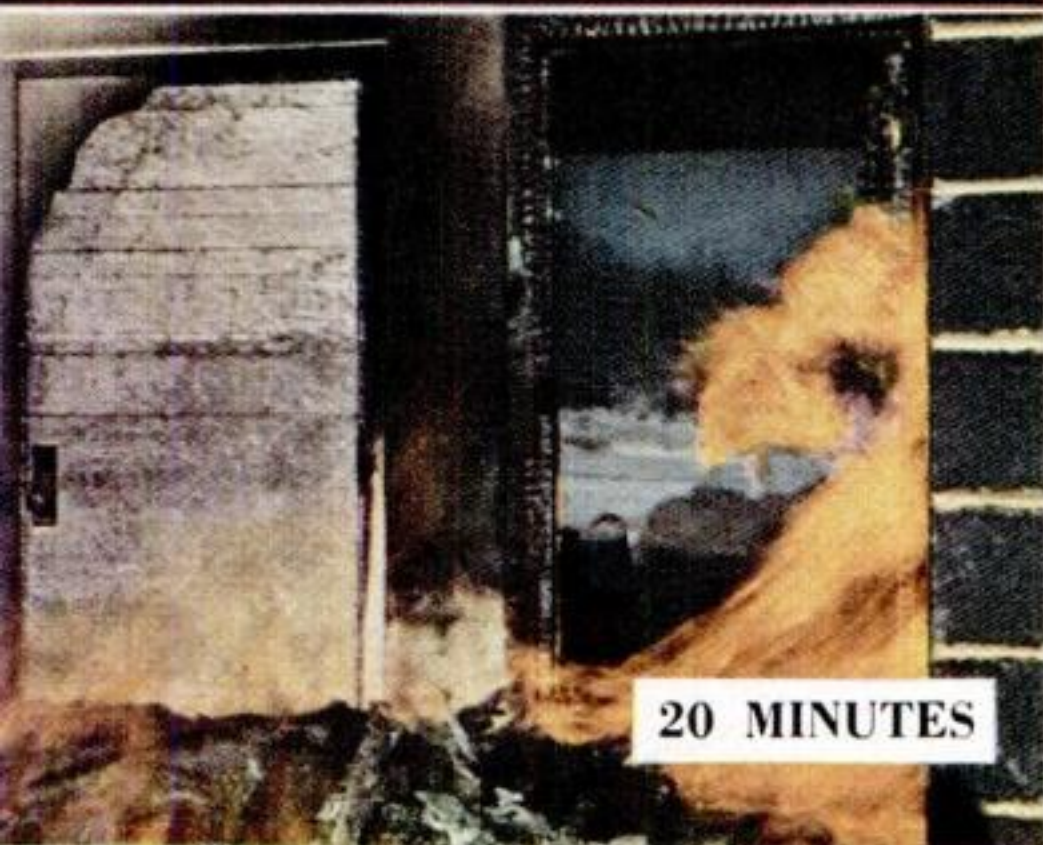




6 MINUTES



14 MINUTES



20 MINUTES



45 MINUTES

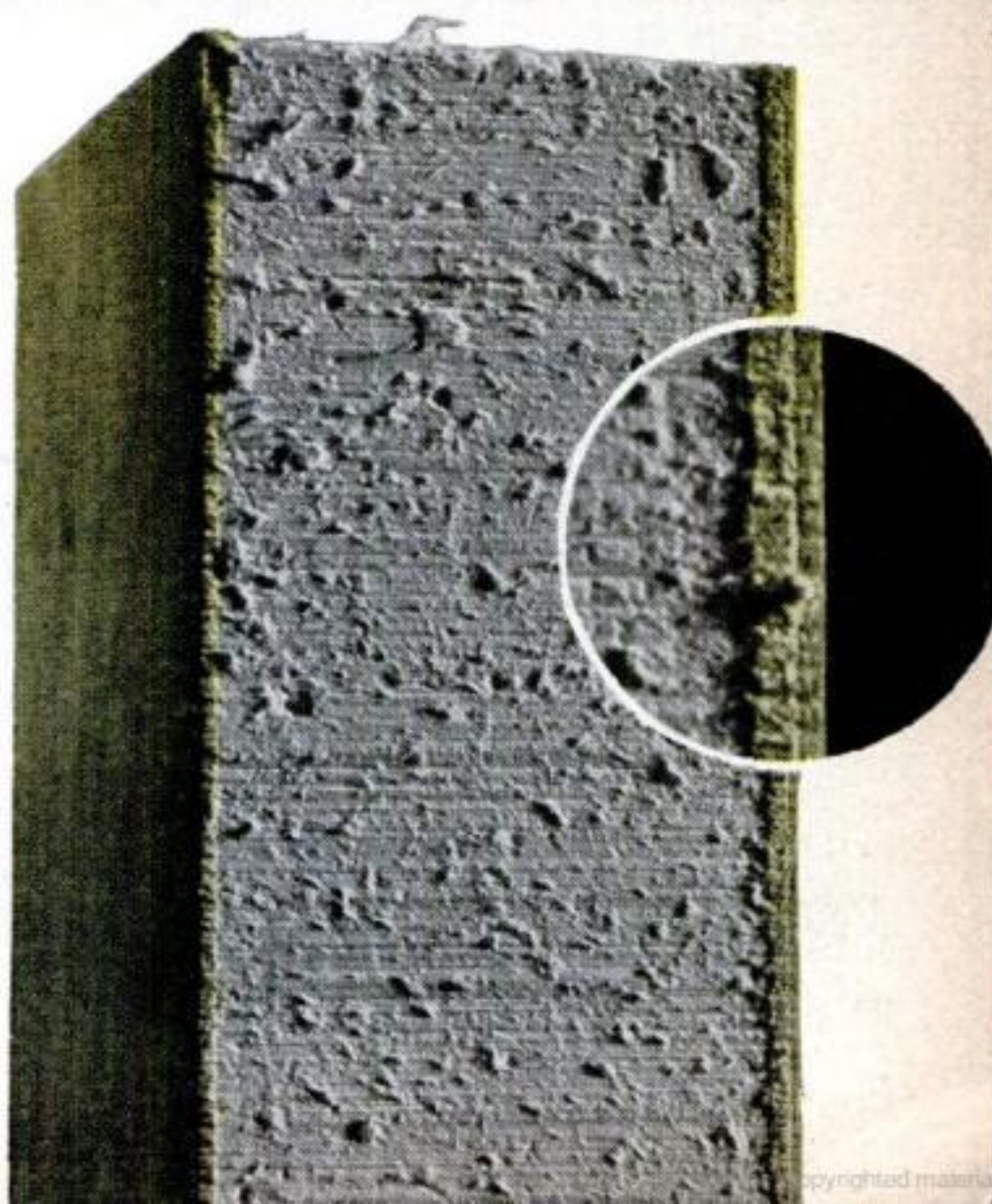
**Results:** Interior views, top row, and later exterior scenes show how flames eat through wooden

door while Kaylo <sup>®</sup> door bars fire. Outer veneer chars, but the core and inner side remain intact.

ican Structural Products Company of South River, N. J., now produces a higher-density insulation especially suited for use in fire-resistant doors and partitions. Because its heat conductivity (which engineers designate by the symbol "K") is low, it has been named Kaylo <sup>®</sup>. It can be sawed, drilled, and nailed with ordinary tools.

A flush-type door using this material will be manufactured and marketed by the U. S. Plywood Corporation as the Weldwood <sup>®</sup> fireproof door. Its cross section is shown, actual size, in the photo at right. A thin, two-layer finish of plywood veneer, seen in the magnified inset, is not intended to survive a scorching. Both the structural strength and fire resistance are in the Kaylo <sup>®</sup> insulation that makes up the rest of the thickness of the door.

END





## New Ideas from the Inventors

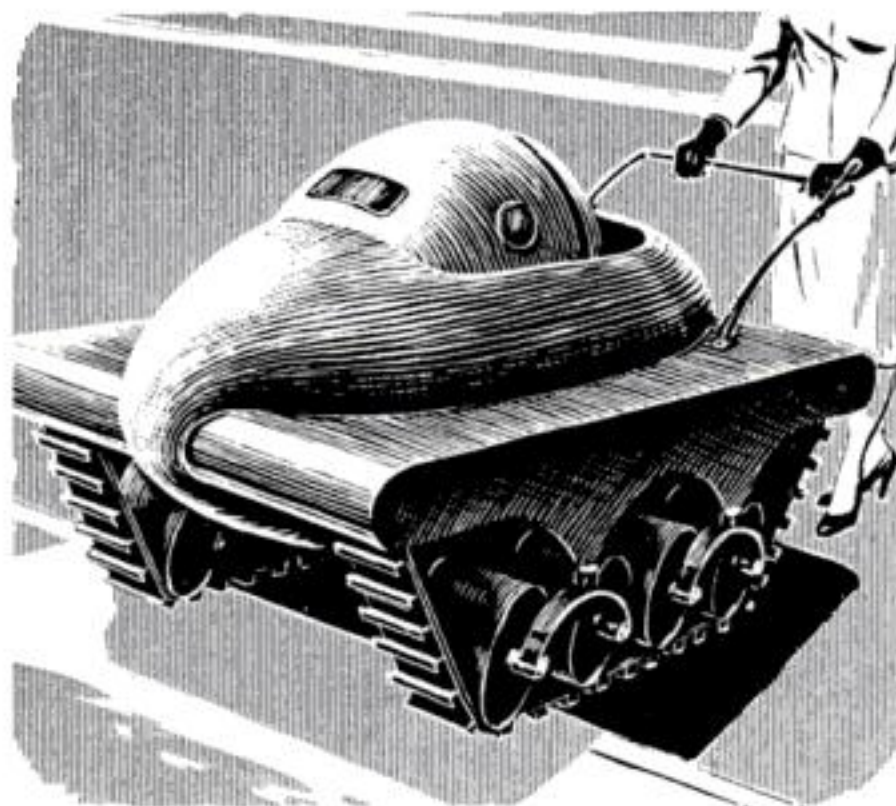


**Seats Save Train Space.** Both diners and waiters aboard railroad dining cars would get a break with the seating arrangement patented by Francis Dittrich, of Chicago. Angled four-tables along one wall

permit waiters to serve from either side instead of having to reach across diners next to the aisle. For greater aisle space, tables along the opposite wall are three-sided, seating two. The seats by the windows are built-in.



**Water Joins Fire Hose.** Water holds this flexible fire-hose coupling together, and the higher the pressure, the tighter the joint. Its two rubber ends are simply squeezed together, and a ridge on one locks into a groove in the other. It was invented by Pierre Delcourt, of Vertus, France.



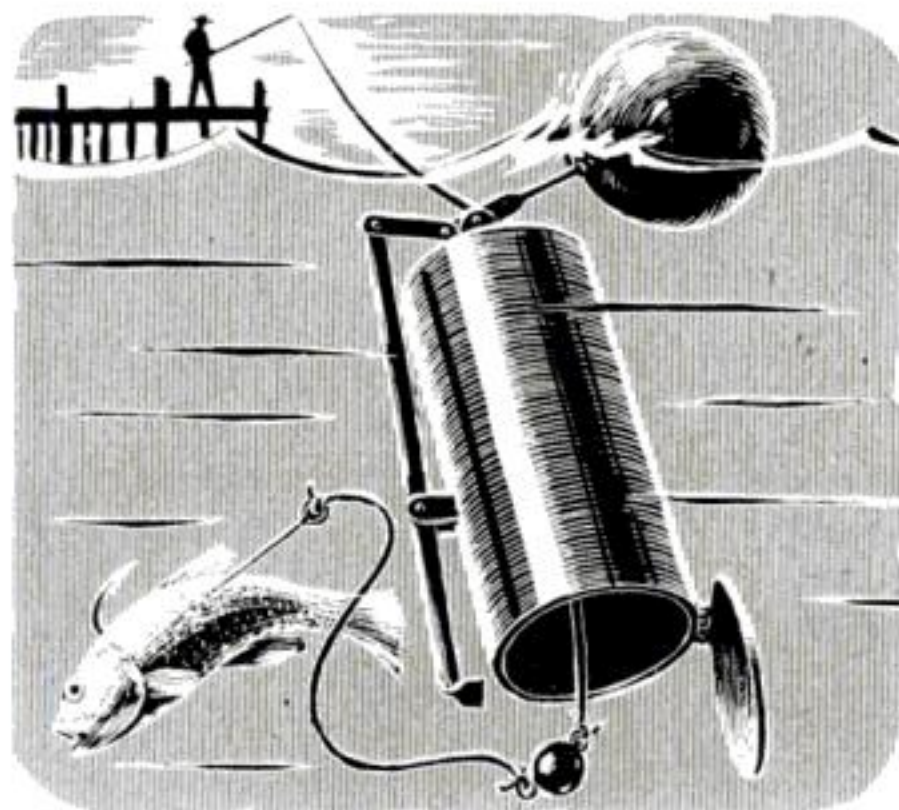
**Mechanized Baby Carriage.** Tracks replace wheels on this novel baby carriage, providing smoother going over curbstones and doorsteps. Patented by Anthony Peronti, of Chicago, it also has an airplane-type canopy to protect Baby from sun glare and rain, and a brake lever on handle.



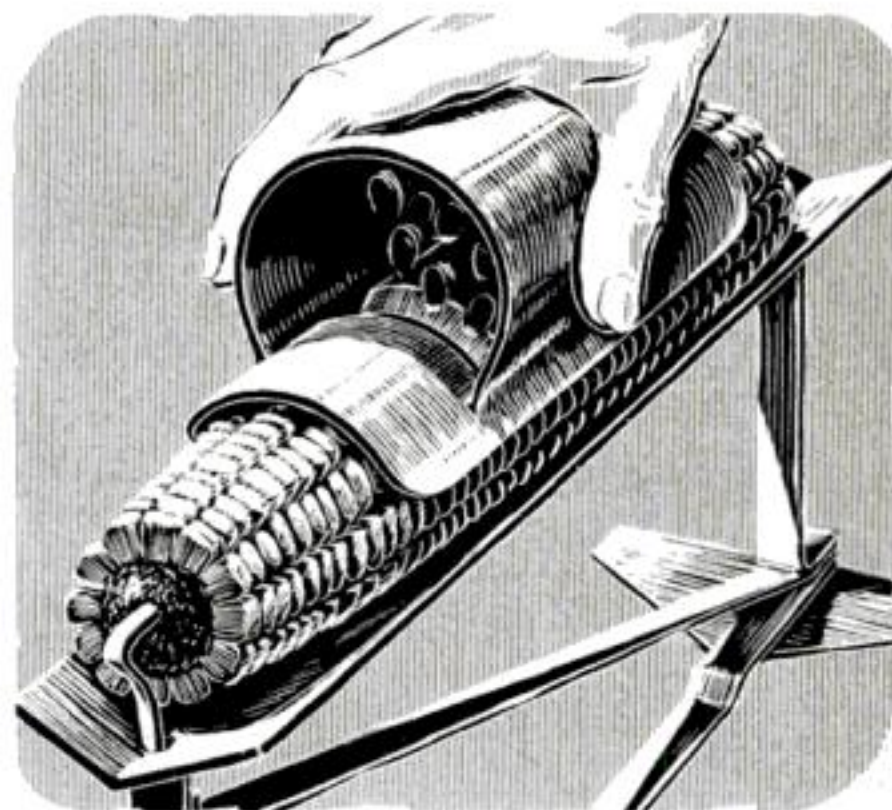


**Slide, Airplane, Slide.** Landing on this airfield would be like sliding in on a giant washboard. Long grooves, shown in profile above, are flooded with soapy water. The bullet-shaped cylinders, replacing

plane's wheels, slip into these grooves and slide along on the soapy water. Its inventor, H. V. Ramirez, of Los Angeles, claims it would guide planes in straight line, save weight and cost of usual landing gear.

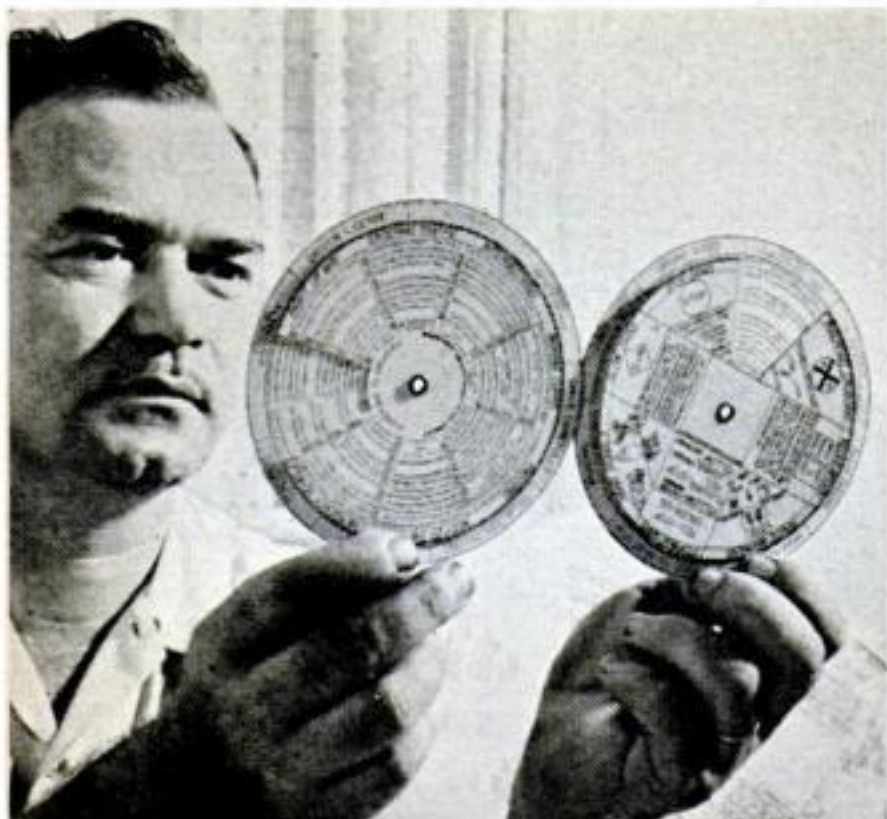


**Container Protects Bait.** A longer life for live bait is the object of this casting container invented by Anders Mason, of Springfield, Mass. When it strikes the water, a cork float on top is forced upward, opening a small trap door in the bottom and releasing the bait, undamaged by the cast.



**Corn Cutter Cuts Scatter.** To keep corn kernels from flying in all directions when sliced off the cob, Arthur Skolrud, of Seattle, has patented a cutter that collects them neatly in a small cup just behind the blade. After each stroke, the cob is rotated on a pronged stand to a new position.





**Inventor Clothier** displays both sides of his Handy Aid to Drivers®. Its three pie-sliced cardboard disks, turning on a common hub, offer quick advice on 30 motoring problems.

# 5th Wheel for Safer Driving

**I**F COLLECTING traffic tickets is your hobby, you won't be interested in this little cardboard wheel. Drivers who prefer to keep out of trouble may find it as handy as skid chains.

Only five inches across and no thicker than three postcards, it contains the gist of all U. S. motor-traffic regulations—boiled down to 1,371 words, classified under 30 headings, and arranged for quick reference. The pictures show how it works.

The Handy Aid to Drivers® is the baby of Joseph L. Clothier, 37-year-old airport-control-tower operator at Tucson, Ariz. Designing the wheel, lettering it by hand, and getting it printed in four colors were the least of his work. Before that came 11 months of analyzing traffic codes of 48 states and dozens of cities.

The result is not a summary of each code, but a capsule guide based on the fundamentals of all codes. In Arizona, for example, an accident that causes damage of \$50 or more must be reported within 48 hours; in California, damage over \$25 in 24 hours; in Louisiana, damage of \$35 in 36 hours. The Handy Aid simply advises: "If death, injury or property damage occurs, regardless of the amount, report as soon as possible to the police." The driver who does that is clear in any man's state or town.



**Front side** of the wheel carries tips for safe driving and warnings of the risks of carelessness. Safety slogans are lettered between the seven segments of the smaller outer disk.

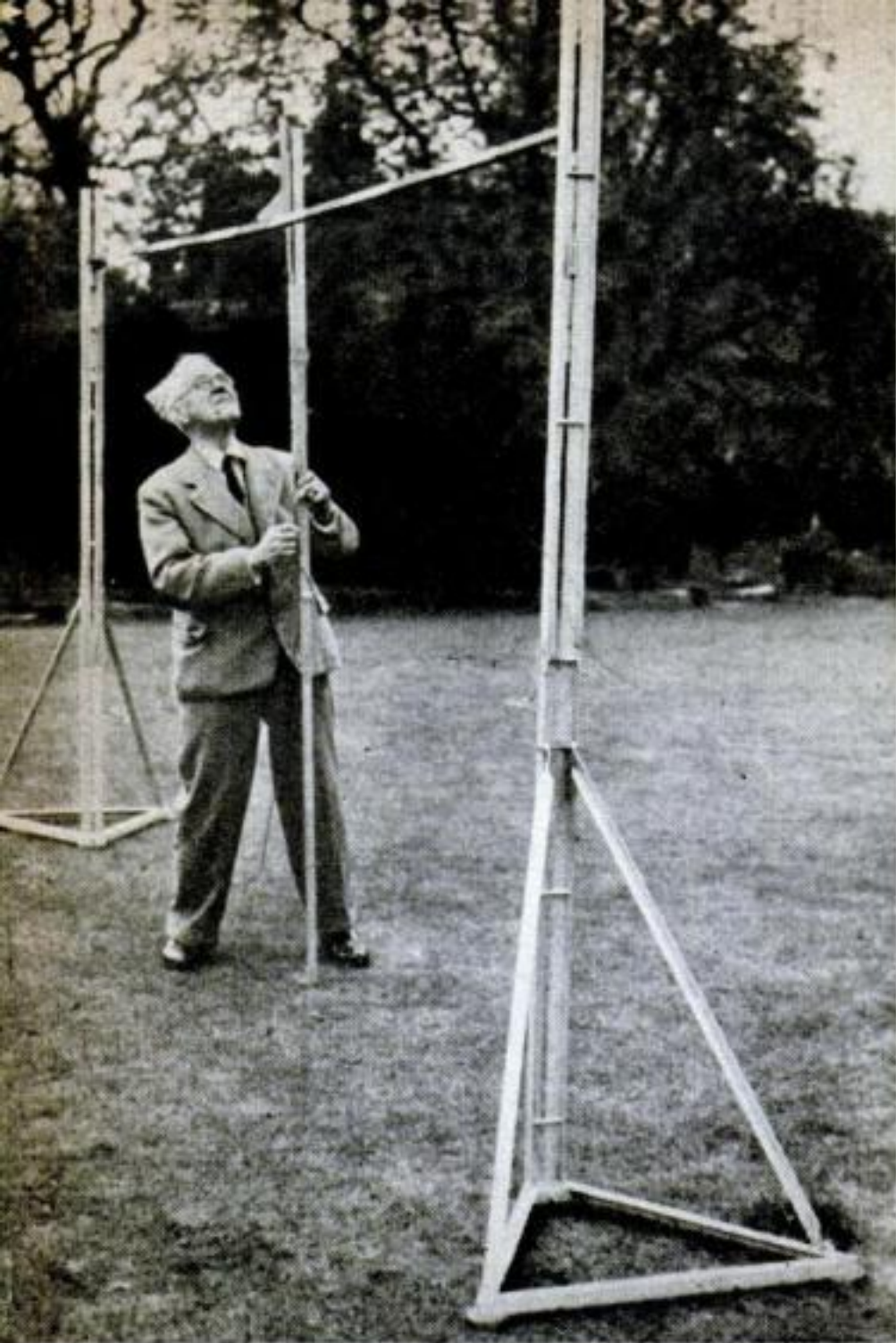


Thirty sections like these contain the gist of motor-traffic regulations all over the country.





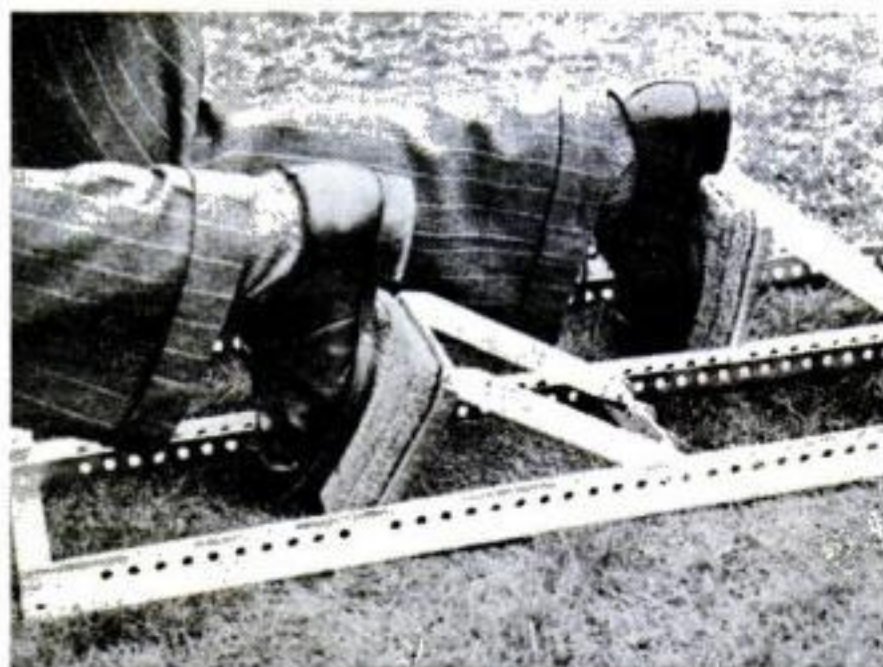




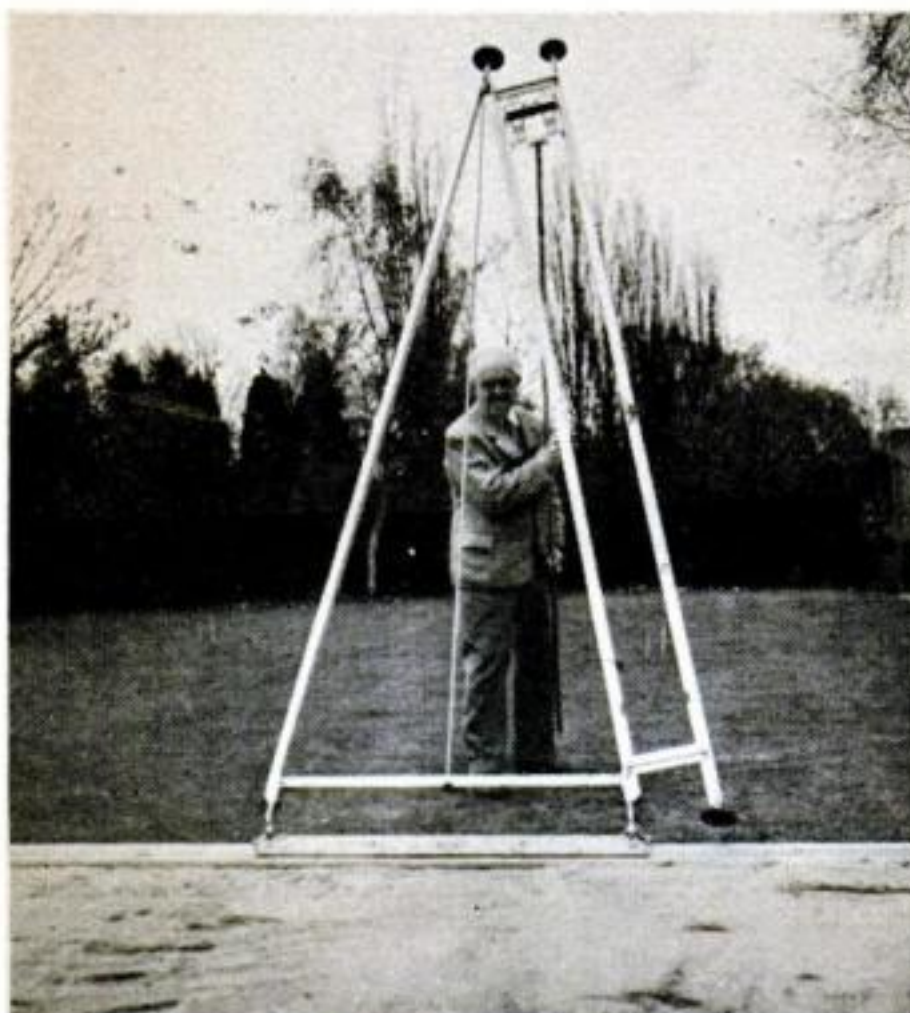
**Pole to measure high jump** consists of aluminum tube and shorter rod that slides easily along it. When cleat on rod is lowered until it just touches crossbar, rod and tube are locked in relative position and then taken down for accurate measurement with a steel tape.

## ***New Entries In the Olympics***

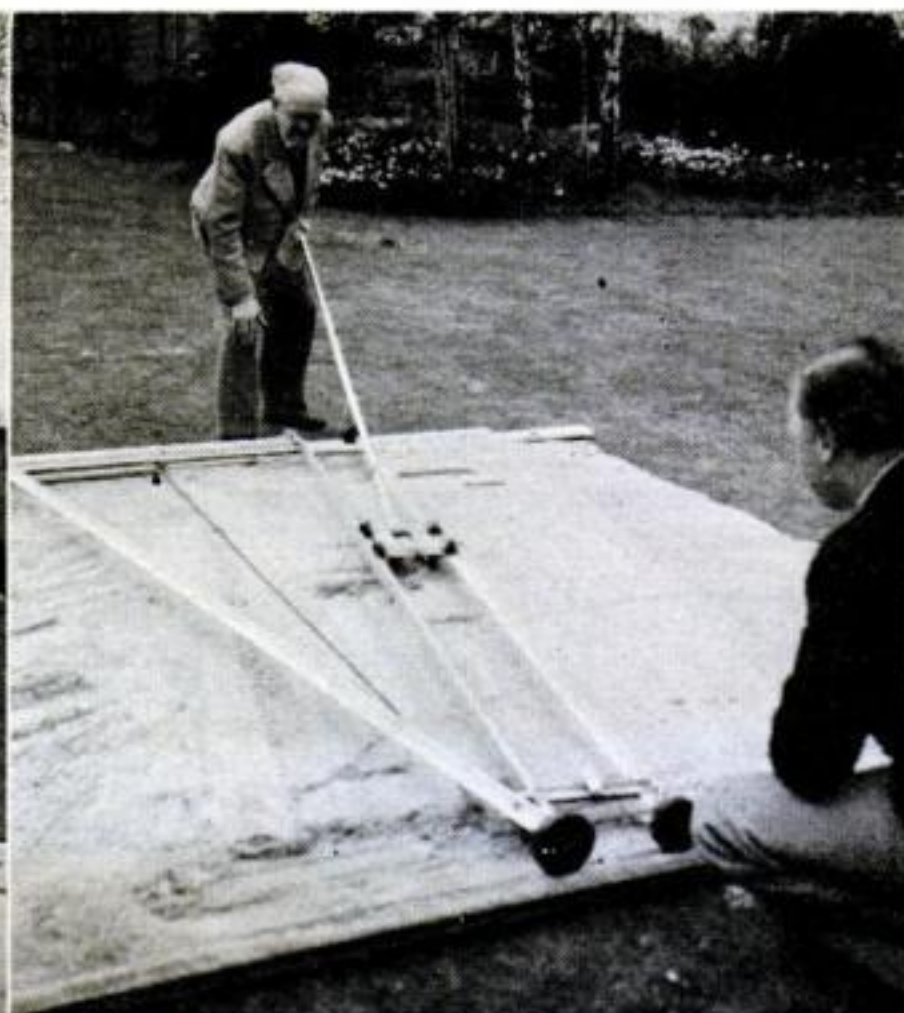
**T**HESE odd-looking gadgets are designed to save time and arguments at the summer Olympic Games, which open late this month in London. A British engineer, H. Rottenburg, developed them as aids to judges and athletes in track and field events. Here he is demonstrating the light, aluminum apparatus at Cambridge, England.



**Mobile starting blocks** for sprinters and hurdlers eliminate digging toeholds into the track. They adjust quickly to any stance and then are held firmly in position by pins through holes in the frame. Pads provide a thick, spongy mat for a good grip on the running-shoe spikes.



**Broad jump is measured** by lowering this frame over sand pit and rolling it along jumper's line of flight to point where cross wire is directly over his heel imprint nearest take-off mark.



Length of jump then can be read on scale fixed to far rail. Afterward, the sand is smoothed (right) by blade on push-pull cart that rolls across the pit on the frame's own parallel rails.





The small Plexiglas ① fuel tank shown above represents one of the five tanks that are a part of the B-50's fuel system. For demonstration

purposes, colored liquid, instead of gasoline, is pumped in. The training units are mounted on plywood panels 5 by 4½ feet in size.

## ***Fuel for the Tanks of the B-50***

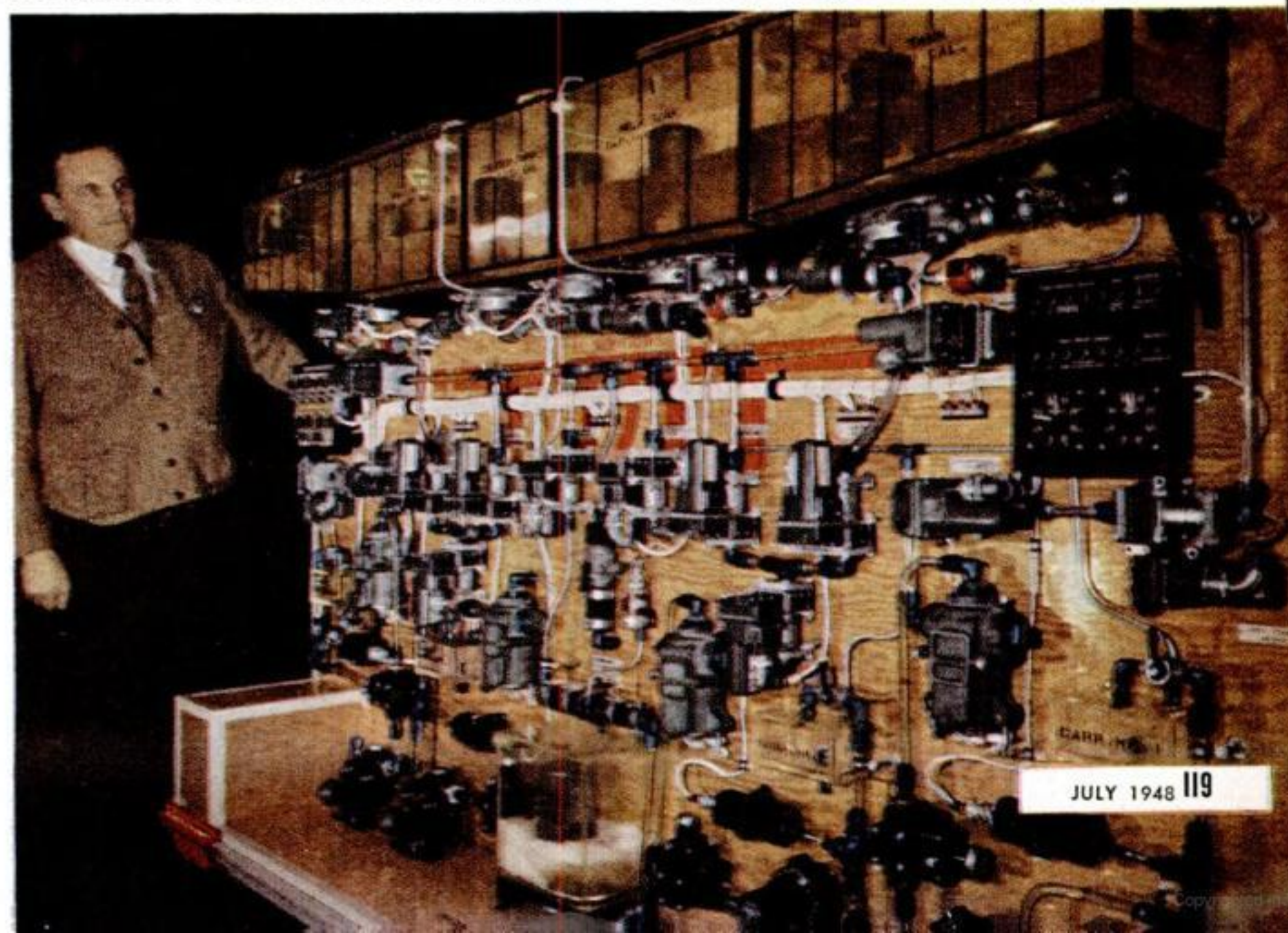
**N**OW being delivered to the Air Force, Boeing's B-50 is more than an improved B-29—it's a new and more powerful weapon for long-range bombardment.

The four 3,500-hp. Pratt & Whitney Wasp Major ② engines drink a lot of gasoline. To get maximum miles out of them, the fuel system must run at top efficiency.

Jumping the gun, Boeing engineers have built training units that will explain the intricacies of fuel flow to crews before they receive the huge new bombers. Other panels include a landing-gear and wing-flap unit that shows operation of the B-50's ball-bearing retractor strut, nacelle-door actuator, and wing-flap mechanism. **END**

The intricate arrangement of tanks, lines, and valves pictured below demonstrates how the fuel system of the B-50 functions. Each part in

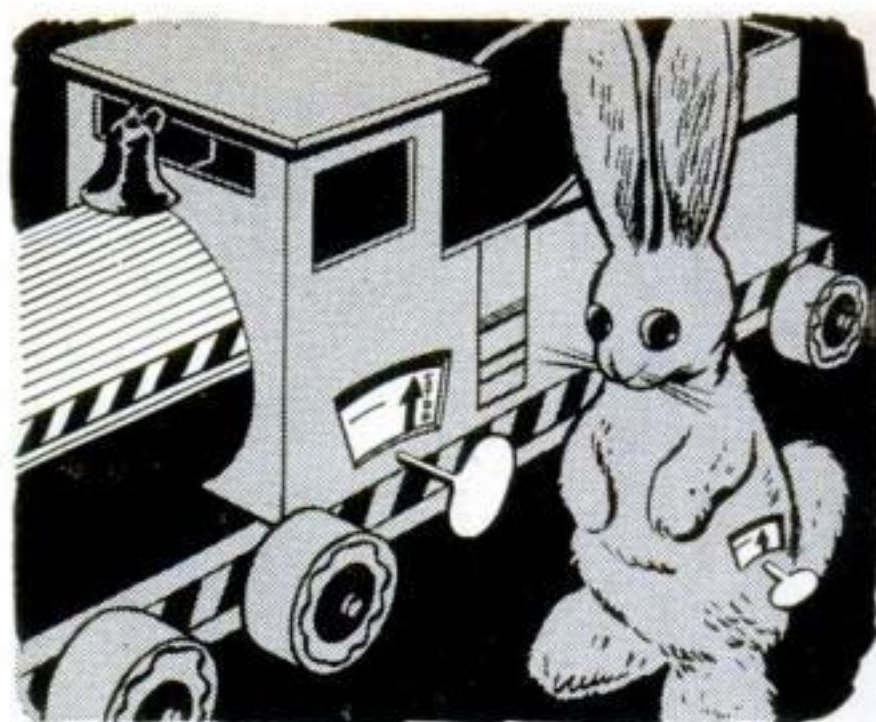
this training unit operates exactly as does its counterpart in the big bomber, differing only in position and, in some cases, in size.



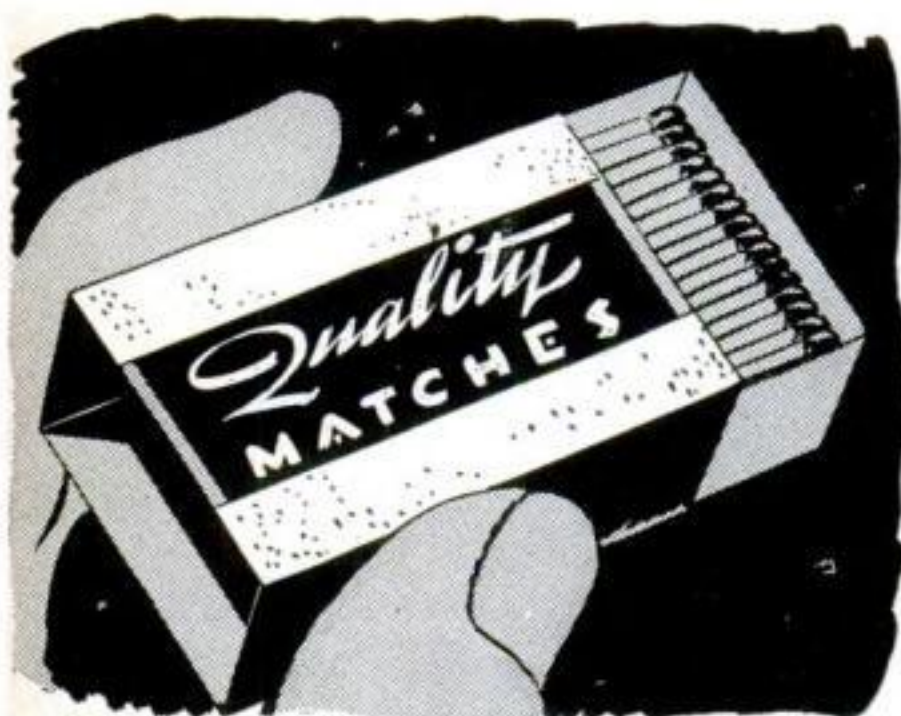


# I'd like to see them make...

Everybody has his own pet idea of some gadget he would like to see in general use. What is YOURS? Popular Science will pay \$5.00 for each one published. Use government postcards only. Contributions cannot be acknowledged or returned.



**Childproof Wind-Ups.** The mortality of wind-up toys through overwinding by children would be lower if the toys came with indicators on them to tell the user when they were sufficiently wound.—Girard Strohl, Allentown, Pa.



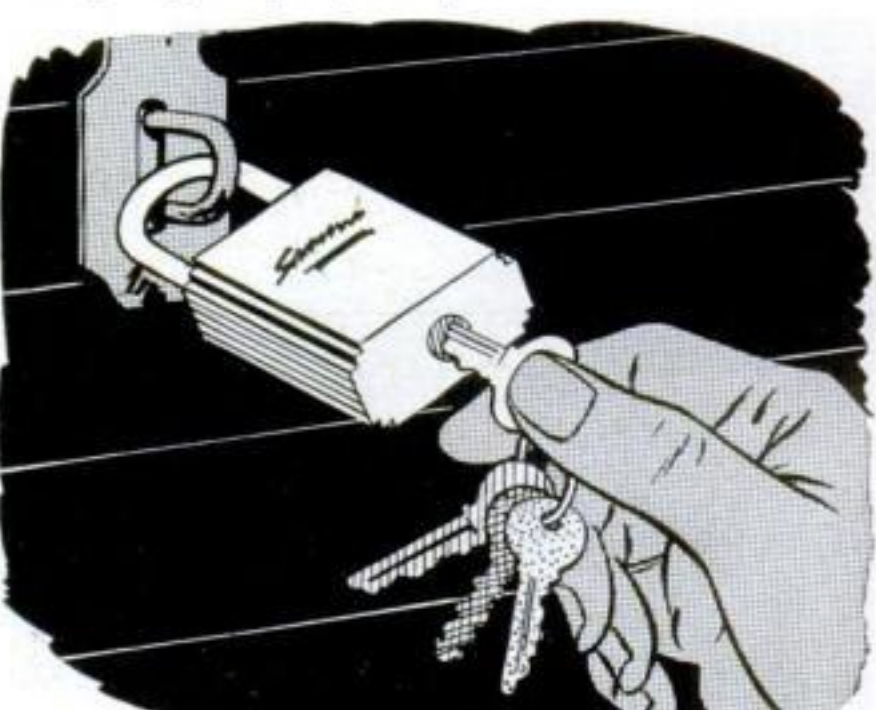
**Right-Side-Up Matches.** Matchboxes with a striking surface on the top, not on the sides, would prevent you from opening the box upside down in the dark and spilling the matches.—B. C. Bamman, Macon, Mo.



**Sewing-Machine Brake.** I'd like to have a brake on a sewing machine that could be operated by foot or knee. It would save having to grab the wheel at ends and turns of seams.—Margie Spolar, Tigerton, Wis.

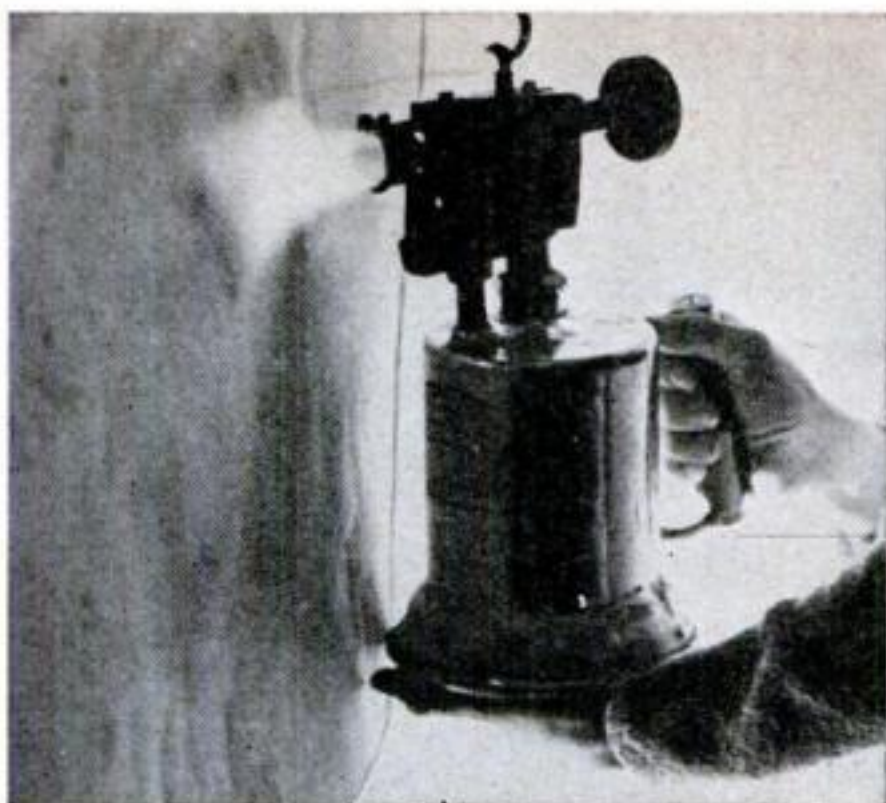


**Hot-Water Indicator.** We're always running out of hot water when washing or bathing. Why don't they put an indicator over the sink that tells at a glance how much is left in the tank?—Kenneth Fiske, Crannell, Calif.



**Keys Identified by Color.** If padlocks and door locks came in different colors with keys to match, they'd take the fidget and fumble out of finding the right key for the right lock.—J. A. Slais, Berwyn, Ill.





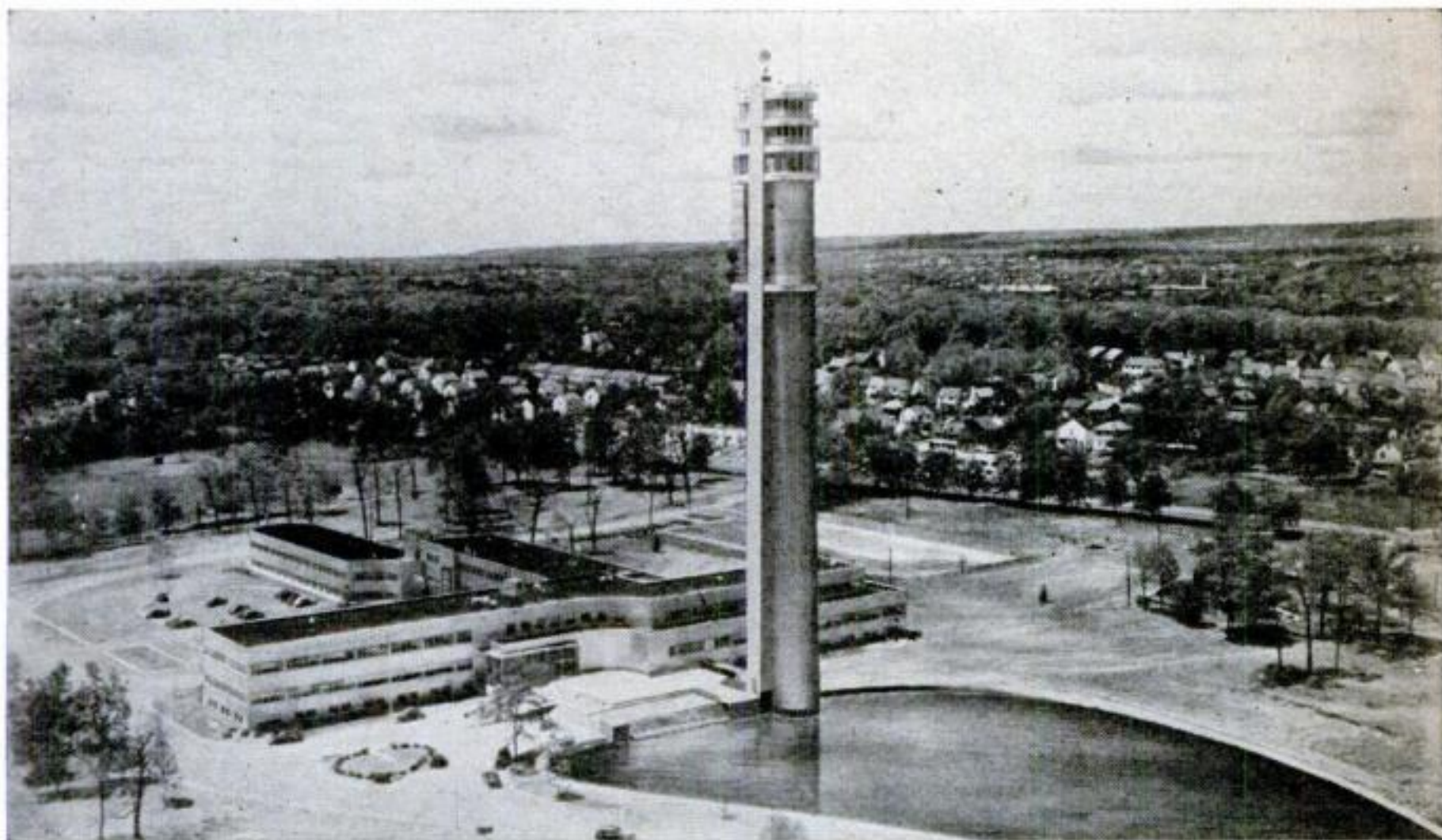
## New Paper Won't Burn

EVEN the flame of a blowtorch won't burn through this new paper, as the test above proves. Called Terratex <sup>®</sup>, it's made of asbestos mixed with clay and pressed into sheets as thin as paper. General Electric, which developed the paper as insulation for high-temperature electrical equipment, predicts many other uses for it.



## Human Power Line

THE lamp held by this Westinghouse scientist is lighted by current from the rod in his other hand. He is showing that high-frequency electricity skims across the surface of a conductor — his body — without penetrating more than a fraction of an inch. This "skin effect" is used to harden just the surface of metal by induction heating.



## Lab Perches on Tower

SCIENTISTS of the International Telephone and Telegraph Corp. work in no ivory tower, but in one of steel sheathed with aluminum. The 300-foot structure, pictured above, is the latest addition to I. T. & T.'s

Federal Telecommunications Laboratories at Nutley, N. J. Designed for research in the high-frequency radio waves used by radar and television, it has workrooms on three enclosed landings near the top, antennas on the roof, and platforms below the main floors for other equipment.



# Super-Microscopes

300,000-VOLT  
"PROTON GUN"  
DELIVERS SPEEDING  
HYDROGEN NUCLEI

300,000-VOLT  
ELECTROSTATIC  
OBJECTIVE LENS  
MAGNIFIES  
200 TIMES

MOUNTING HOLDS  
SPECIMEN TO  
BE EXAMINED

Full power of projected proton micro-  
scope would magnify the molecule  
pictured below to the size of this circle.

300,000-VOLT  
ELECTROSTATIC  
PROJECTION LENS  
INCREASES MAG-  
NIFICATION TO  
20,000 TIMES

PHOTOGRAPHS MADE  
HERE MAY BE  
OPTICALLY EN-  
LARGED TO GIVE  
CLEAR MAGNI-  
FICATION UP TO  
600,000  
TIMES OR MORE

COMPARATIVE SIZE  
OF MAN INDICATES  
GIANT SIZE OF  
16-FOOT-HIGH  
PROTON MICROSCOPE

Pea-sized white sphere in  
this remarkable electron  
micrograph is believed to be  
a single molecule of polystyrene  
latex. Magnification of 110,000  
diameters is more than half the  
extreme power of today's microscopes.

Artist's drawing illustrates design  
of proposed proton microscope,  
with top magnifying power of  
600,000 diameters or more.



**A design harnessing a 300,000-volt beam of protons  
heads current projects for instruments of unprecedented power.**

# to Open New World

**By Alden P. Armagnac**

A NEW type of microscope is being designed at the College of France, in Paris. It is to be built around a 300,000-volt tube of a type hitherto used only in atom-smashing experiments. And its inventor, Claude Magnan, expects this "proton microscope" to give three to four times the magnification of today's finest instruments.

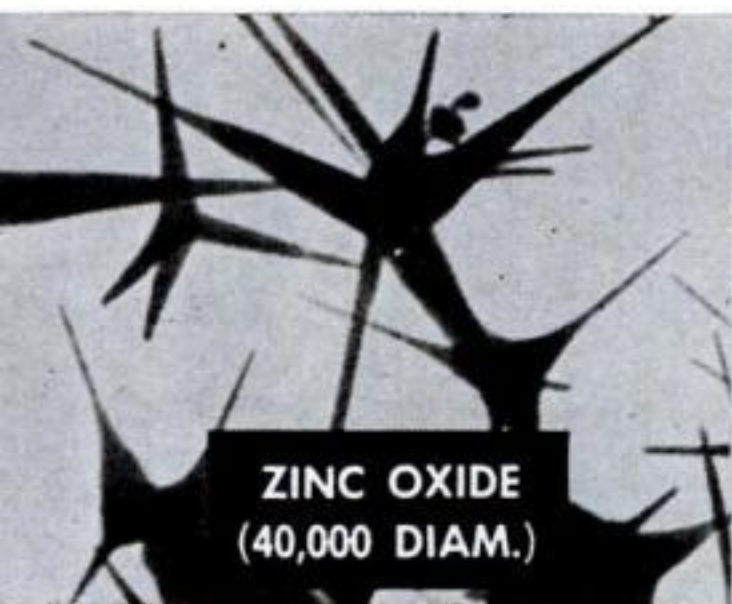
The new 16-foot-high microscope will look like an enlarged counterpart of the electron microscope, the most powerful of existing types. In place of a beam of electrons, however, the giant 'scope will use a stream of hydrogen ions, or protons, delivered by a new "proton gun" that Magnan has devised. The effect, similar to reducing the wave length of light used in an optical microscope, will be to multiply the magnification attainable.

Two electrostatic lenses will focus the proton beam—the first giving a magnification of 200 diameters, and the second increasing this magnification to 20,000 diameters. Images registered on film will be sharp enough to be further enlarged at least

30 times, giving a final magnification of 600,000 diameters or more.

Making clear its limitations as well as its advantages, Magnan points out that the proton microscope will remain a special-purpose tool. Because protons lack the penetrating power of electrons, its application will be restricted to specimens of such extreme thinness as to be "transparent" to protons, or to objects of which only the surface is to be explored. It will not, therefore, outmode the more versatile electron microscope, or steal the spotlight from experimenters working to improve this type.

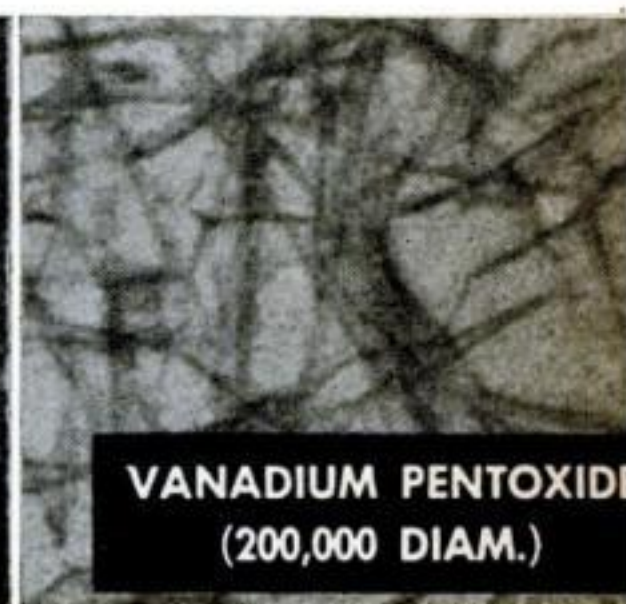
Today the most powerful instrument in the world is the experimental electron microscope of the RCA Laboratories at Princeton, N. J. Dr. James Hillier has recently boosted its useful magnification with an improved magnetic lens. A new telescopic eyepiece enables him to view its fluorescent-screen images directly at top magnification, formerly attainable only by making photographic enlargements from film records. Now he can either see or take pictures of an object magnified to the almost inconceivable figure of 200,000 times its original



**ZINC OXIDE**  
(40,000 DIAM.)



**DIAMOND**  
(30,000 DIAM.)



**VANADIUM PENTOXIDE**  
(200,000 DIAM.)

Turning electron microscope on minerals reveals, left to right, oddly spiked metallic smoke

particles, new details of a gem's surface, and, at maximum power, ultra-thin fibers of a catalyst.



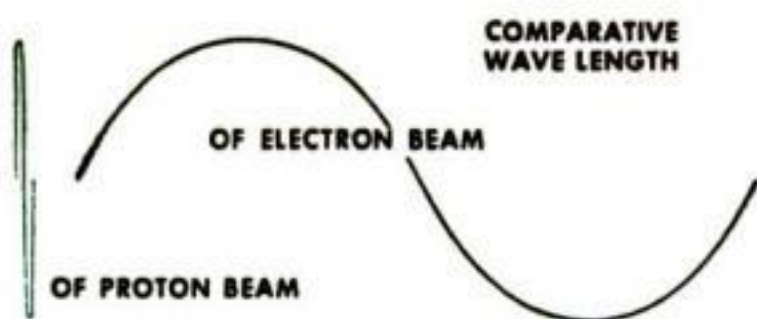


## Protons vs. Electrons for Ultra-High-Power Microscopes

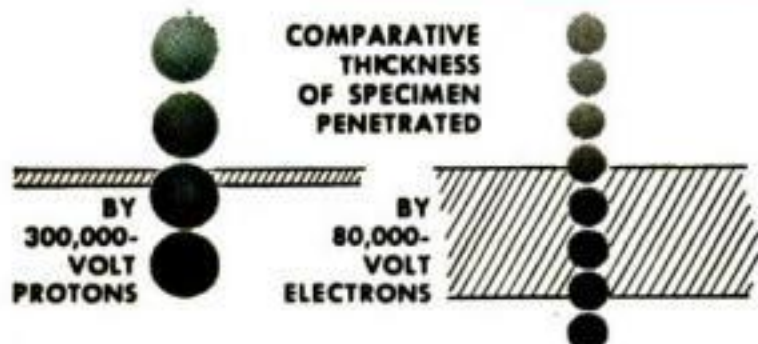
PROTON ELECTRON

COMPARATIVE SIZE

It takes higher voltage to propel protons, which have 1,840 times the mass of electrons.



Proton beam, with 1/40 the wave length of electron beam, improves resolving power.



High-voltage protons penetrate specimen only 1/10 thickness of that pierced by electrons.

COMPARATIVE SIZE OF SMALLEST PARTICLE VISIBLE

WITH ELECTRON MICROSCOPE



WITH PROTON MICROSCOPE



Proton microscope should be at least three times as powerful as electron microscope.

diameter. And experts say that the full theoretical power of the electron microscope, toward which they are striving, is 10 times greater.

What sets the limit of a microscope's power? Simply by making its tube longer, a designer can give you any magnification you ask. But what really interests you is "resolving power," or ability to give clear-cut outlines. This is what determines the smallest object a microscope can possibly reveal. And its *useful* magnification is the number of times that this object is smaller than the tiniest pinpoint the unaided eye can see—which is an object of 1/250 to 1/125 of an inch in diameter, such as the larger amoebas and "slipper animalcules" found in pond water.

Using ultraviolet light and photography,

the most powerful optical microscopes reveal objects such as bacteria as small as 1/250,000 of an inch in diameter. Since this is just 1,000 times smaller than the smallest mote the naked eye can see, their useful magnifying power is 1,000 diameters. Actually, photographs may be made through these microscopes at higher magnification, to save eyestrain in examining details—but *no amount of magnification beyond 1,000 diameters adds a single detail that was not visible before.*

Electron microscopes, in contrast, attain a useful magnification of hundreds of thousands of diameters. Exactly as glass lenses focus a beam of light, their magnetic lenses focus a stream of electrons passing through a specimen, producing images on a fluorescent screen or a photographic film that

According to adjacent pounds to a layer between —COO the sol chains are in a limit. If weight, ular weight, where  $\rho$  is

id the water

H groups get

When an

but attr

'noosit'

2221, 1916) in solids and li the identity of the mole ale probably occurs. W are not spheres. Wer instead of spreading ov substance soluble in w —COOH groups are process leads the oil o il not spread over wa es when all the wat e area covered by eac onstant. The vertical a of the molecule.

presence of

hydrocarbon ch

ter and the

all the —

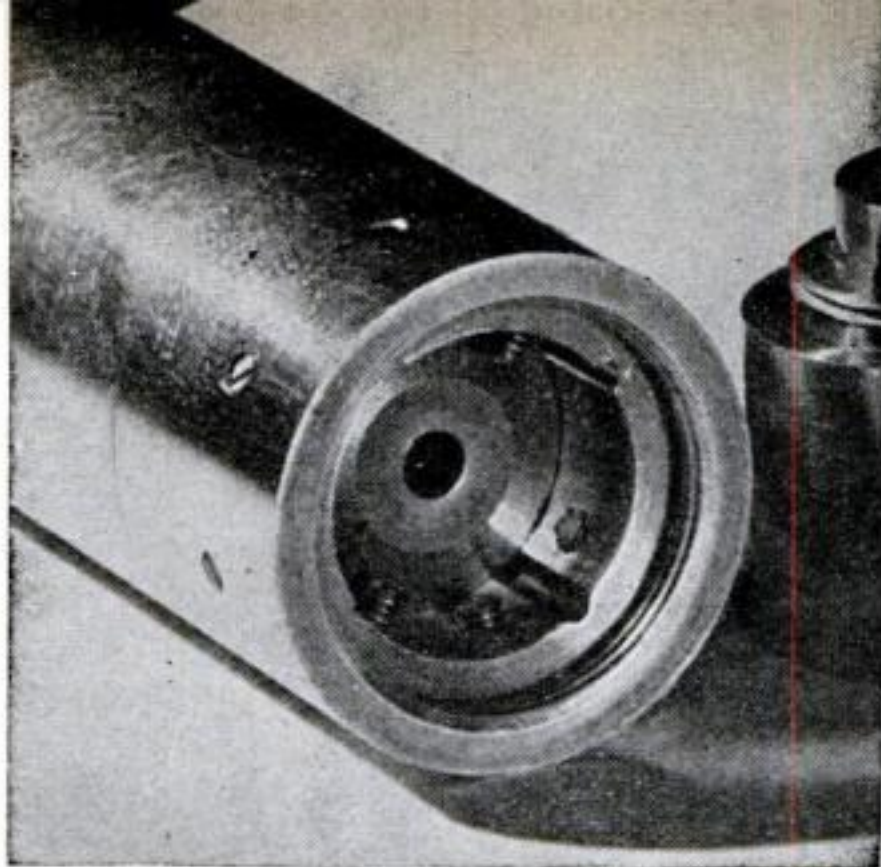
'ix wit'

combined anic com- te points sted be- COOH, creases carbon groups When water. molec- =  $W/pA$

What determines a microscope's power? Enlargements above represent views through two microscopes that magnify equally. Microscope with poor resolving power gives blurred image

at left. Microscope with superior resolving power gives sharp image at right. Its *useful* magnification is greater, since it makes tinier details, like shape of top of "t," clearly visible.





**Improved magnetic lens**, above, helps electron microscope to reveal objects as small as molecules. New feature is use of tiny screws to adjust magnetic field to near-perfect symmetry.



**New eyepiece** of RCA experimental electron microscope, the most powerful in the world, enables Dr. James Hillier to view objects directly at its full 200,000-diameter magnification.

reveal objects as small as a fraction of a millionth of an inch! At this enormous magnification, germs prove remarkable creatures with "feet" or "tails." Viruses, elusive organisms that pass through the finest filters, have been photographed at last. Bacteriophage and antibodies, mysterious things that once were only scientific theories, now can be seen in action.

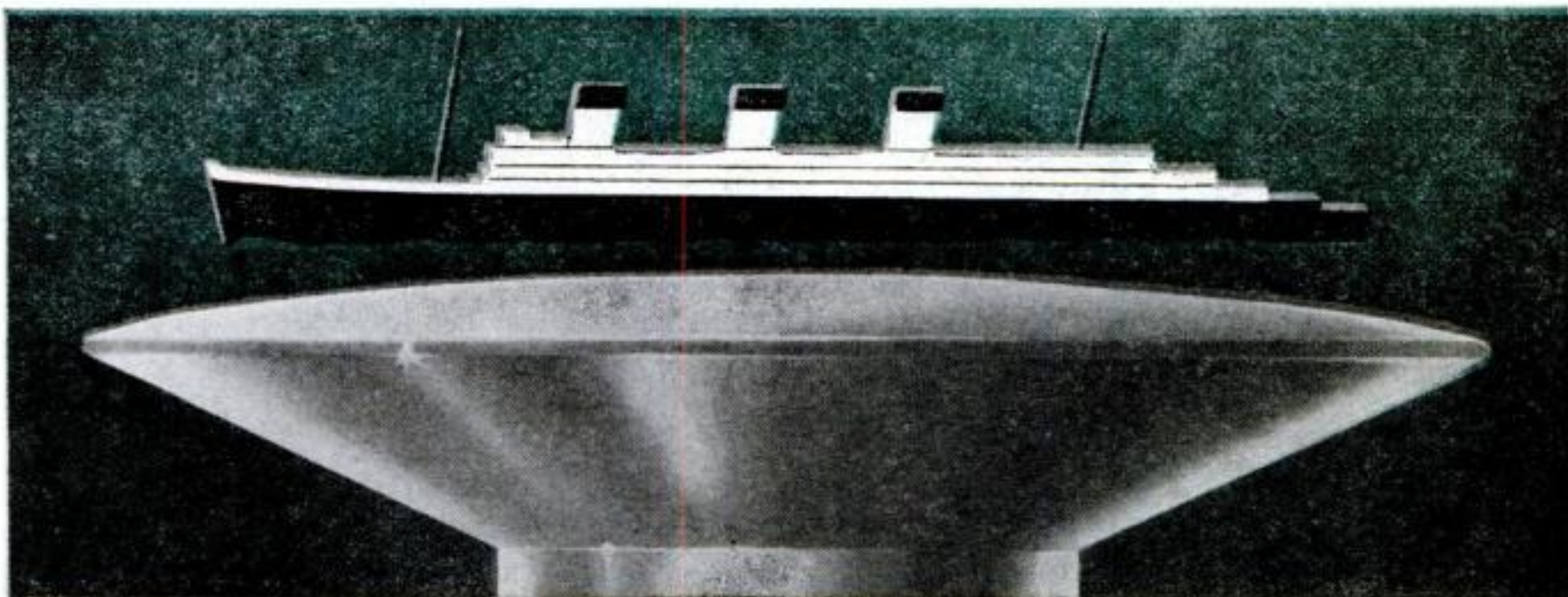
#### ***First View of a Molecule***

Perhaps the most sensational sight revealed by the electron microscope is one that scientists have been characteristically cautious, pending absolute proof, about proclaiming. But it no longer seems possible to doubt that globules resembling tennis balls, seen in specimens of such materials as polystyrene latex, are man's first view of

molecules. Their size can be calculated from theory, and the objects seen exactly fit the prediction. Just as a camera has no difficulty in getting a picture of a person who is shivering, the to-and-fro motion of these giant molecules would be too slight in comparison with their size to interfere with taking their picture.

What wonders await microscopes of still greater power? Can there be living creatures of smaller size than any yet seen? Can we hope to peer into the molecule and see its atoms—which in hydrocarbon compounds are calculated to be only 1/125,000,000 of an inch apart? It is to answer fascinating questions like these that research workers seek new ways of seeing farther into the world of the infinitely small.

END



**If a pinhead** were enlarged 200,000 diameters, the distance across it would exceed the 975-foot length of the *Queen Mary*, as shown, and its area would be large enough for a regiment

to camp upon. The graphic comparison illustrates the amazing power of magnification of a microscope today. Now designers are striving for instruments of even greater power.



# Oilmen Make Swamps Talk

**S**CIENCE has simplified the job of spotting new oil beds to feed a petroleum-hungry world, but the oil explorer's life is still no cinch. Before he can use the sensitive instruments that give him a picture of what lies below the earth's surface, he may have to lug them across a desert, up a mountain, or—as pictured here—through the heat-ridden tangle of a Louisiana swamp.

These men are members of a seismographic crew of the Humble Oil and Refining Co. (a Standard Oil of New Jersey affiliate), operating in the bayou country around Lake Arthur. Because boats can't get clear into the swamps, they have to back-pack food, fuel, explosives, and bulky

equipment through mud and junglelike undergrowth.

Reaching a predetermined location, they set up their equipment, fire an underground blast, and record the resulting earth tremors. Then they pack up and move on to do it all over again—up to 10 times on a good day. Packs are limited to 35 pounds, and frequent rest stops ease the strain, but it's rough going for all that.

At night, the men return to the comparative comfort of a houseboat base, and every 10 days they get a four-day break outside the swamps. Then back they go again, to make the swamp spill more of its secrets—and possibly some oil.



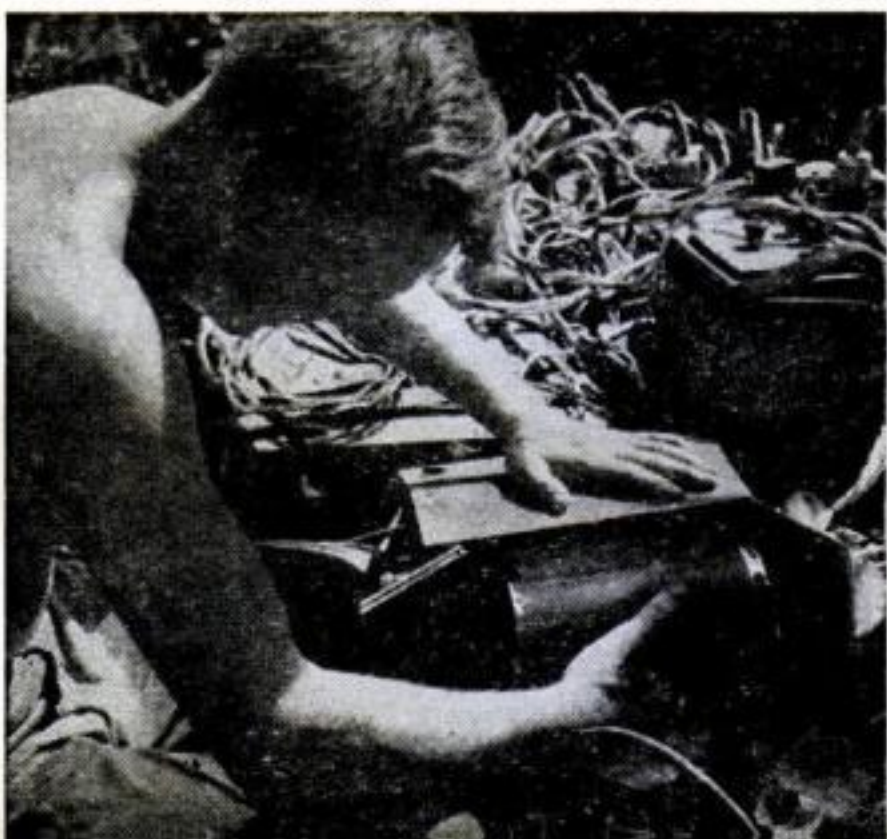
**Outboard motor head**, lightweight power source, drives centrifugal pump to supply water for hydraulic drill. Water is pumped from a slush pit, dynamite-blasted out of the swamp.

**As the blast goes off**, operator rotates drum of photo recording device. Impulses from the ground pickups go through amplifiers (foreground) and are translated into light beams.



**Muddy drillers** bore holes as deep as 80 feet, making sure explosion tremors reach subsurface levels. When hole is ready, several sticks of explosives are dropped down it, then set off.

**Drum of sensitized paper** inside recorder gets a picture of man-made earthquake. Reflected tremors appear as a series of wavy lines, their intensity depending on the strata beneath.







**Hitting the trail** to start a day's operations, pack-toters leave boat at the edge of a bayou.



The survey crew goes ahead of the seismographic team to mark the location of each "shot."



**Cable handlers** lay wire along a carefully surveyed line from the apparatus that records the reflected explosion waves. This part of the operation is done while the drillers are at work.

**A lightproof bag** becomes a portable darkroom, and the recorder film is developed immediately after each shot to make sure nothing failed. If not successful, shot is repeated at once.



**Ground pickup phones**, pushed into the soft soil, are attached to the wire every 200 feet. Thus dispersed, these sensitive "ears" gather a comprehensive pattern of explosion's effect.

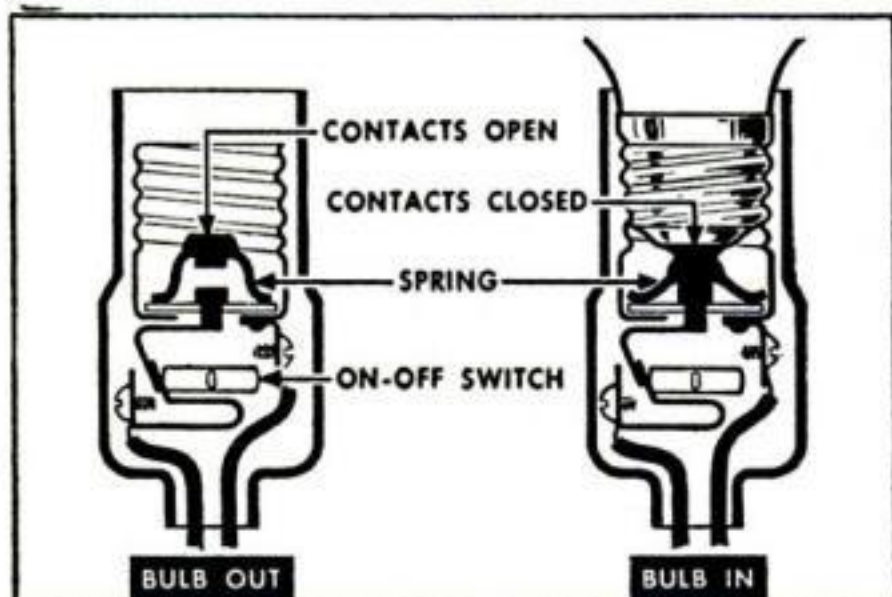
**The completed record** gets a final OK. It looks like a graphic analyst's nightmare, but its squiggles may tell geologists the whereabouts and extent of new oil beds under the bayous.





# New Gadgets Aid Home Safety

**Y**OU'RE still risking your life every minute you stay home—in a year 33,500 people are killed, 5,000,000 injured at home, more than in automobile accidents—but applied science promises to reduce this danger. Shown here are some of the newest gadgets to eliminate common home accidents. These devices won honors in the annual safety contest sponsored by Lewis & Conger, New York hardware store. Selections were made on the basis of effectiveness, simplicity, and reasonable price.



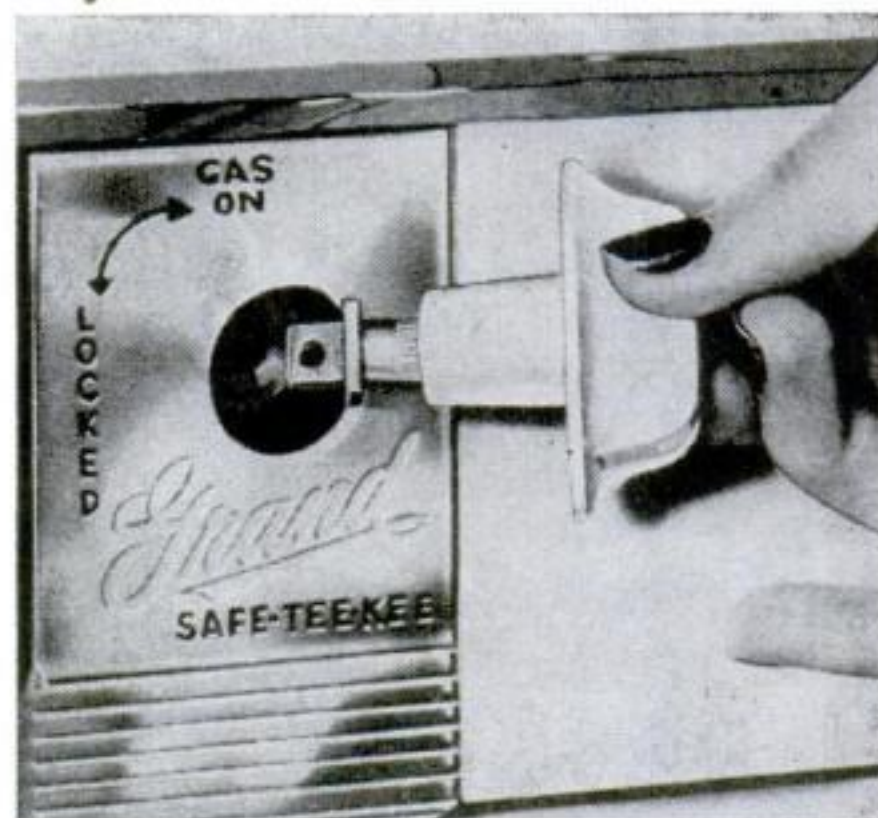
You can't get a shock with the Non-Shock Safety Socket <sup>®</sup> even if you stick a finger in it. In addition to the standard on-off switch, it has a second, spring-operated switch that automatically breaks the circuit if the bulb is taken out (left-hand drawing). The spring is very heavy,



keeping the circuit open even if a child pushes hard against the contact. The threads on the bulb give a jacklike action that easily forces the safety switch closed, permitting the bulb to light. The safety socket is manufactured by the S-P Socket Co., of New York City.



The Signalite <sup>®</sup> fuse tells you when it blows out by lighting a tiny neon glow lamp in the center of its handle. Turning this handle puts a new fuse element into operation, each fuse containing six elements. It is made by the Signalite Fuse Co., of Bloomfield, N. J.



A shut-off valve, controlled by a removable key, keeps children from turning on the gas jets in the new Grand Safe-Tee-Kee <sup>®</sup> cooking range. The valve stops the flow of gas to all burners except the pilots. The new stove is made by the Grand Home Appliance Co., of Cleveland.



# The Horn That Shouts Like a Man

**Vocal cords of this new loudspeaker vibrate a stream of air to produce a shout that can be heard 10 miles.**

**By William P. Vogel, Jr.**

**T**HE loudest loudspeaker ever built works the same way your voice does—but it makes more noise than a champion hog caller locked in a telephone booth.

The Dilks Vocal-Aire <sup>®</sup> loudspeaker, now being manufactured by two young engineers in a small factory in the little town of Seymour, Conn., talks by modulating a moving stream of air, just as your larynx modulates currents of air from your lungs. The nub of their unit is two carefully machined grids, one stationary and the other mobile, counterparts of the human vocal cords. A motor-driven compressor drives air through the slots in the grids,

while the mobile grid is made to vibrate by audio impulses from an amplifier.

This sets the entire column of air directly into sympathetic vibration, and the result is a sound that can be heard 10 miles away.

In your home radio or phonograph the voice coil of the loudspeaker vibrates the cone—really just a special shape of the diaphragm in old-fashioned earphones. The cone, in turn, sets the surrounding air into sympathetic vibration. But where high sound intensity is required the cone-type speaker is not very efficient: in the triple-play conversion of electrical audio impulses into sound waves that you can hear, a lot of energy is lost.

Because its vocal cords vibrate the air directly, a Dilks unit with a 20-watt amplifier can produce sounds many times louder than those from an ordinary speaker using the same amount of power.

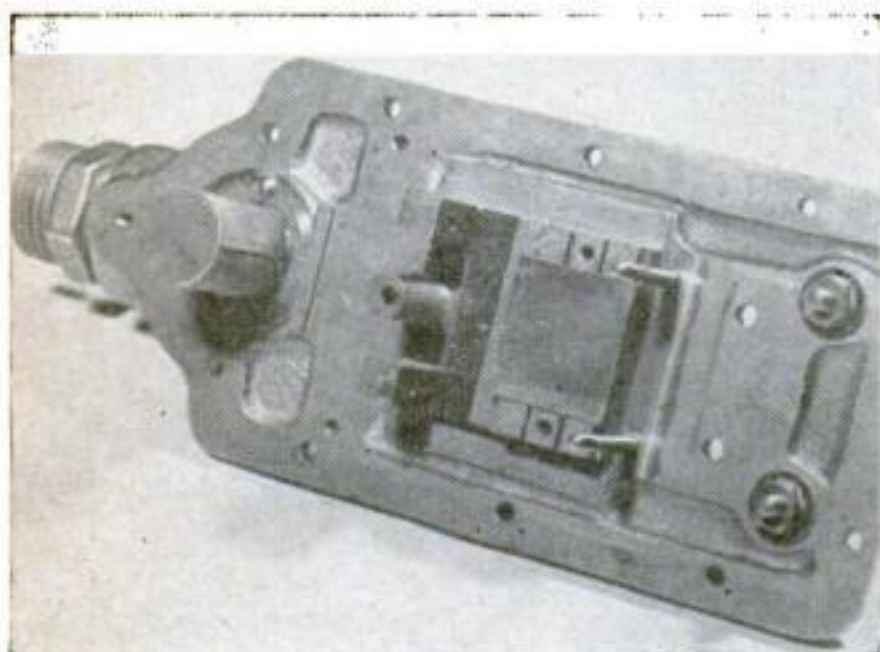




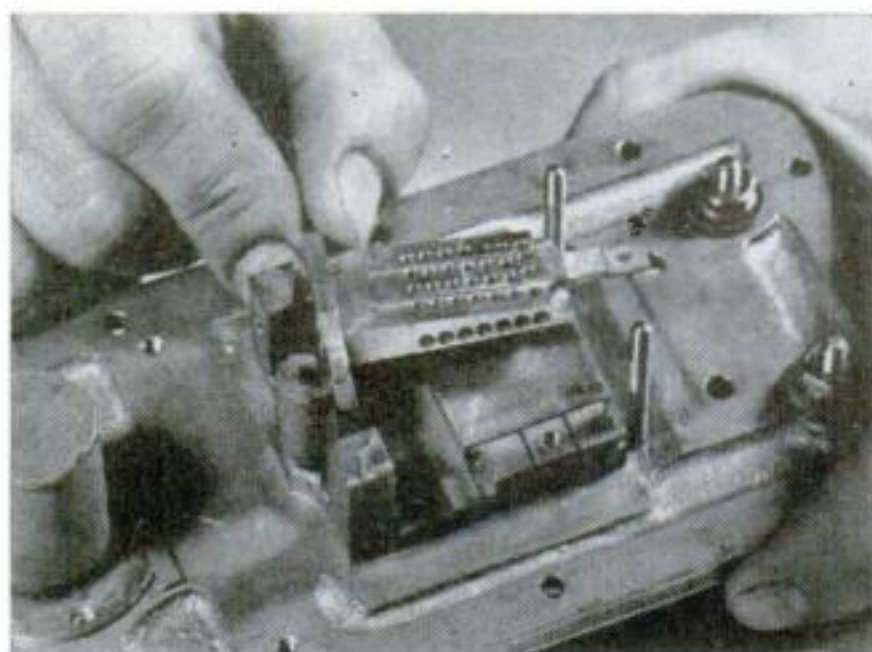
During the war, the Navy, at Floyd Bennett Field, Brooklyn, got the same coverage from one Dilks speaker it could have obtained from 25 conventional horns each fed by a 20-watt amplifier. Only two Dilks units, each equipped with two horns, cover the Yale Bowl. The New Haven, Conn., fire department uses a Dilks speaker to control crowds and traffic and to give orders to firemen inside a burning building. In Arkansas an aluminum refinery recently tested a Dilks system to shout above the noise of six Diesel-electric generators. The air-column speaker works unusually well over water and also for "talking down" aircraft without radio. For airplanes themselves, the low weight-to-output ratio of the Dilks speaker makes it a natural. It can be heard farther and more clearly, with its 90 to 100 lb. of weight, than a conventional system weighing 750 lb.

For 50 years researchers trying to devise ways of modulating an air column directly were unable to overcome high distortion and the difficulty of relieving excess air pressure. Just before the war the late Charles F. Dilks licked distortion by the design, size, and shape of the grids. He then solved the pressure problem with a delicate pressure compensator that was controlled by the distension of a diaphragm built into the housing of the voice box.

Before his patents were issued, Dilks used to cut the grids secretly, in a locked room, with a special lathe and a handmade saw consisting of 40 small circular toothed blades, of precisely graduated sizes, set along a spindle. Grids can now be cut more publicly, but the tolerances must be just as fine as in Dilks's early models. Present design of the unit calls for 40 slots in the stationary grid, 39 in the mobile grid.



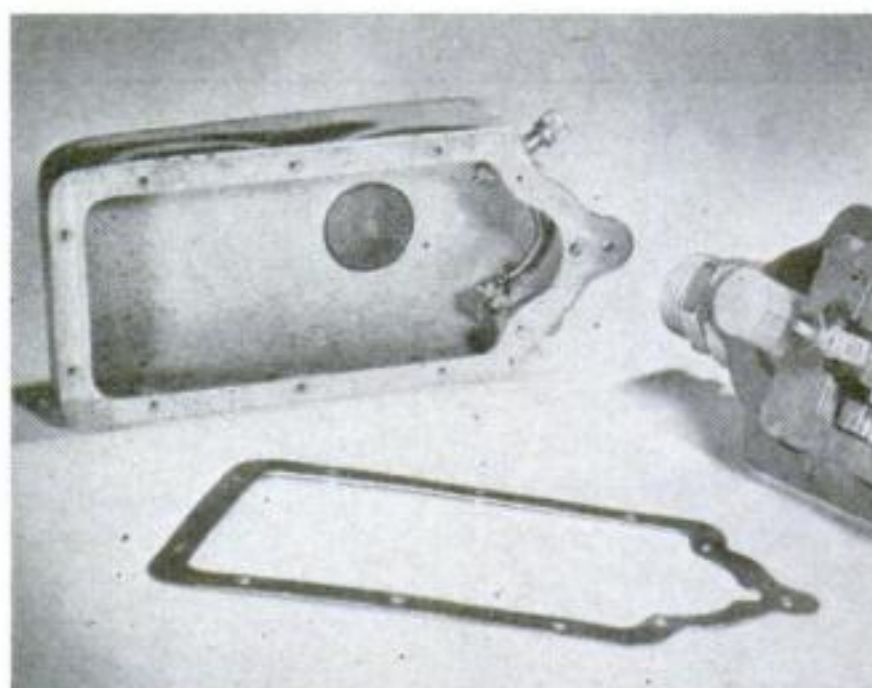
**Opened voice box** of Dilks Vocal-Aire <sup>®</sup> loud-speaker shows stationary grid in place near center of plate. Its 40 narrowly spaced slots form one-half of speaker's set of vocal cords.



**Mobile grid** is put in place. Holes let air flow through smoothly. Below them, out of sight, are slots and reeds to fit over those of the fixed grid. Spur at its right is steel armature.



**Pressure-compensating arm** is attached to the mobile grid. It prevents excessive pressure of the air from holding the smoothly planed grids together and thus locking the mechanism.



**Housing of voice box** is made of bronze coated with zinc. Dark circle on its inner surface is rubber diaphragm that moves pressure compensator. In foreground is air-seal gasket.



The slots are .006 inch wide and are spaced .015 inch apart. The touching surfaces of the grids are ground and lapped to a high degree of flatness, so that when the reeds of one are mounted over the slots of the other a perfect air seal results.

The free end of the mobile grid carries a steel armature, which floats between the poles of a magnet that makes the grid vibrate when audio pulses flow through the voice coil. Here, again, close tolerance is necessary; the armature must clear the lower pole piece by .001 inch and the upper one by .006. Thus, when the speaker is operating, the mobile grid will float free in its vibrating range of .002 inch without hitting either pole pieces or stationary grid. If it did hit, the resulting "chatter" would destroy tone quality and intelligibility.

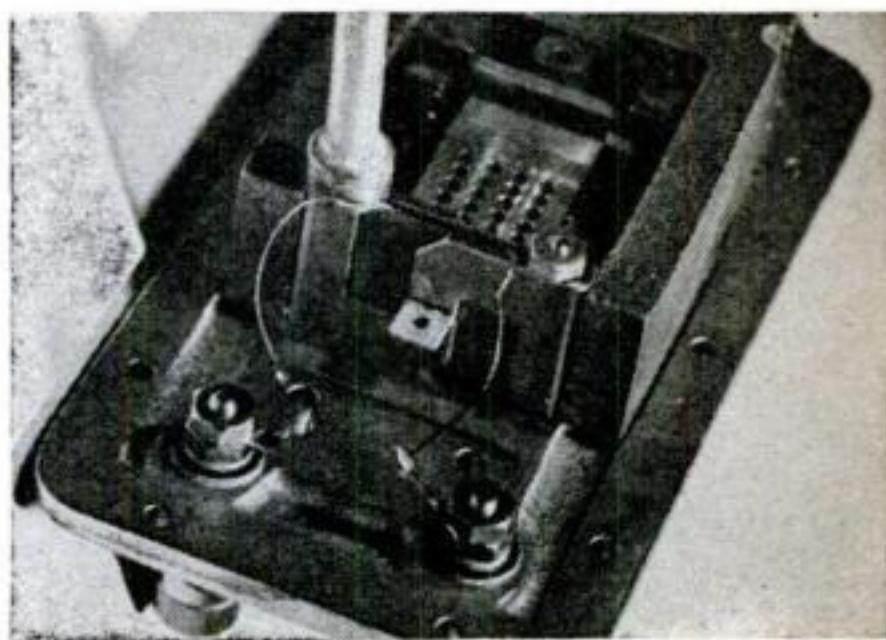
When his company was reorganized last fall after Dilks's death, William Petzold, 29,

chief engineer, and Frank Holdenecker, 35, factory superintendent, bought some of the assets and patents, and set up shop for themselves on the banks of the Naugatuck River. There, where they can test their units on high power without scaring too many dogs and chickens, they are making and selling standard Dilks units, as well as a new portable rig.

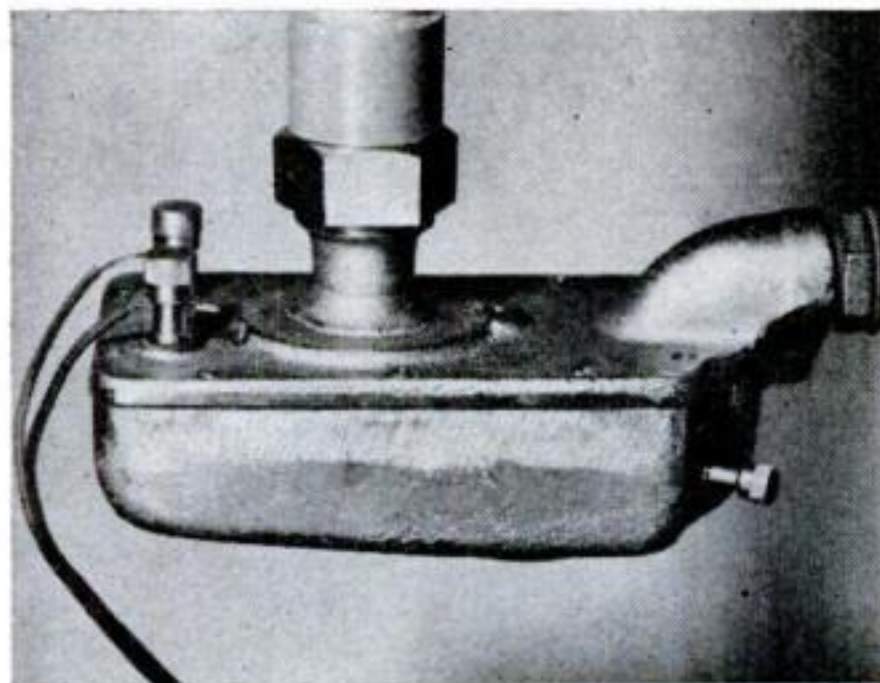
Their big research problem—which, for lack of rules to go by, they must attack by cut-and-try—is to get higher fidelity. At present their speaker doesn't respond to very low tones. Its frequency range of from 250 or 500 cycles up to 5,000, depending on the size of the horn, compares unfavorably with the 50 to 8,000 cycles in high-fidelity radios. This gives the Dilks unit a deep enough base for human speech, but its makers do not recommend it at present for high-quality musical reproduction. **END**



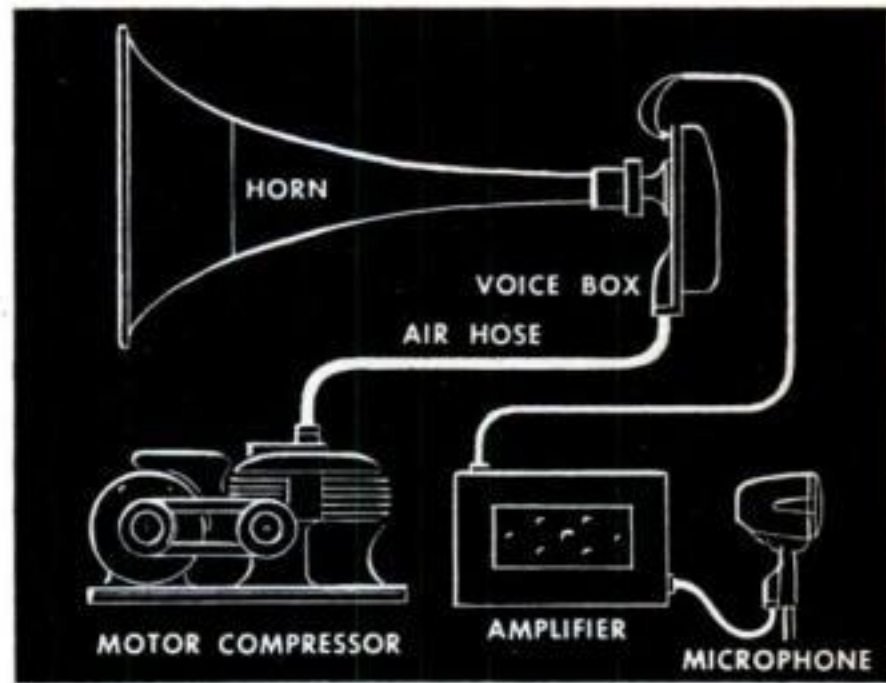
**Poles of magnet** are slid into position (see photo at right for final arrangement) above and below armature, which now sticks through the round, flat voice coil enclosed in plastic.



**Buzzerlike setup** of coil, magnets, and armature causes mobile grid to vibrate in time with audio pulses relayed from microphone. This motion then vibrates air passing through grids.

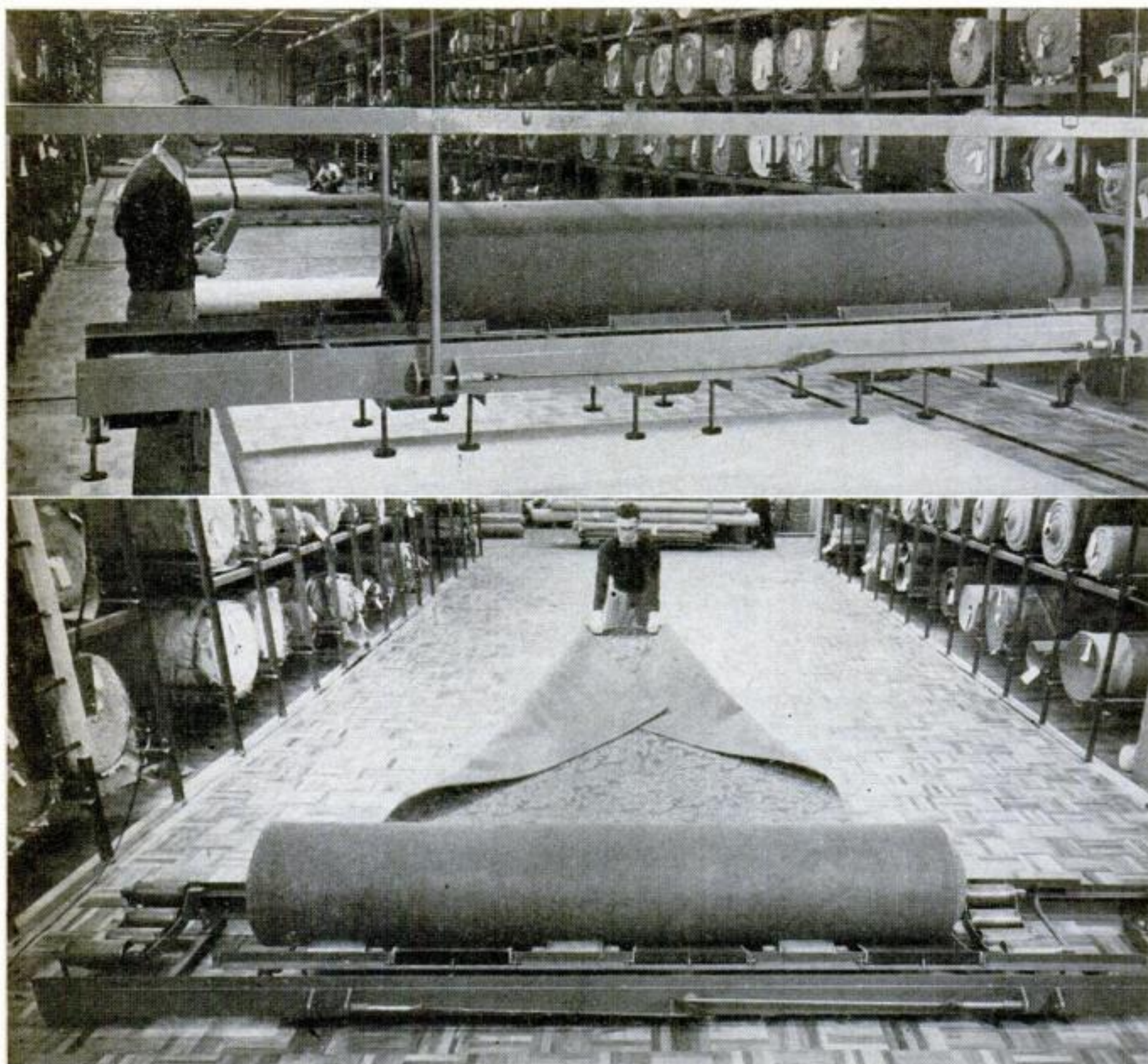


**Assembled voice unit** has connection at left from the amplifier to the voice coil; coupling at right is for the air hose from the compressor. At its top is the stem of the loudspeaker's horn.



**How it works:** Audio pulses from mike, relayed by amplifier, vibrate grid in voice box. Vibrations are transmitted to stream of air from compressor and go out through horn as sound.





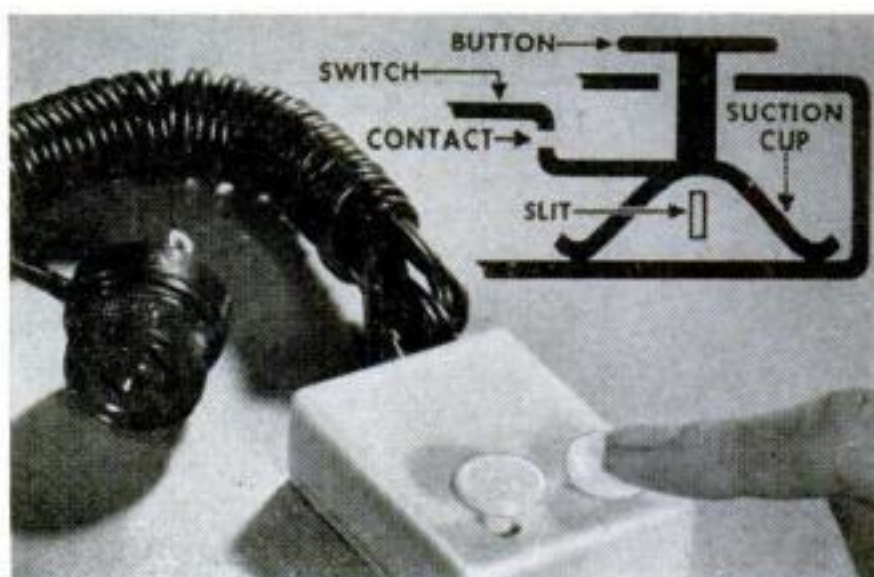
## Crane Aids Rug Cutter

WITH this Cradle System <sup>®</sup> you can be king of the rug cutters—literally. One man using its combination crane and cutting table can handle rolls of carpeting up to 30 inches thick. In storage, each roll rests in its own cradle: three strips of heavy duck webbing on a steel frame. When the cutting table, suspended from a single track

along the ceiling, is swung end-to-end with the storage compartment, the cradle slides onto the table on ball-bearing rollers. As the table is lowered to the floor, the 16 plungers, visible in the top photo, lift the roll off the cradle. The carpet then can be unrolled for cutting. Afterward, the roll is returned to its bin by simply reversing the operation. The crane-and-cradle can be adapted to handling other bulky goods.

## Button Cuts Radio Gab

Now you can listen to the radio without having to listen to the commercials. The button switch at right, called Commercial Control <sup>®</sup>, plugs into the power circuit between wall outlet and radio. When either button is pushed, a suction cup holds the switch open until enough air leaks through the slit to close the gap. One button cuts off the radio for 30 seconds; the other extends the silent period to a minute and a half.

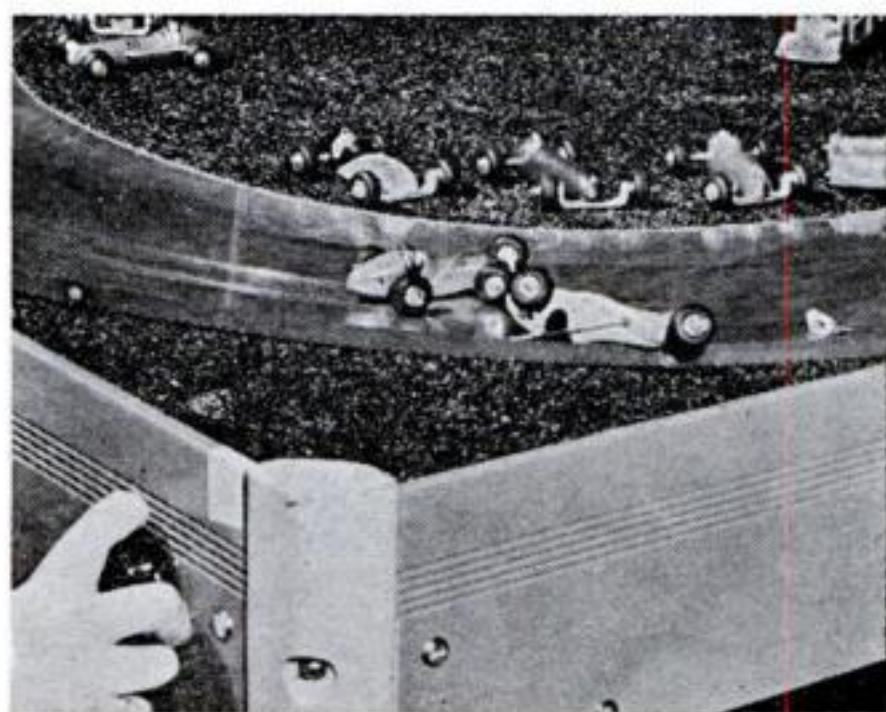




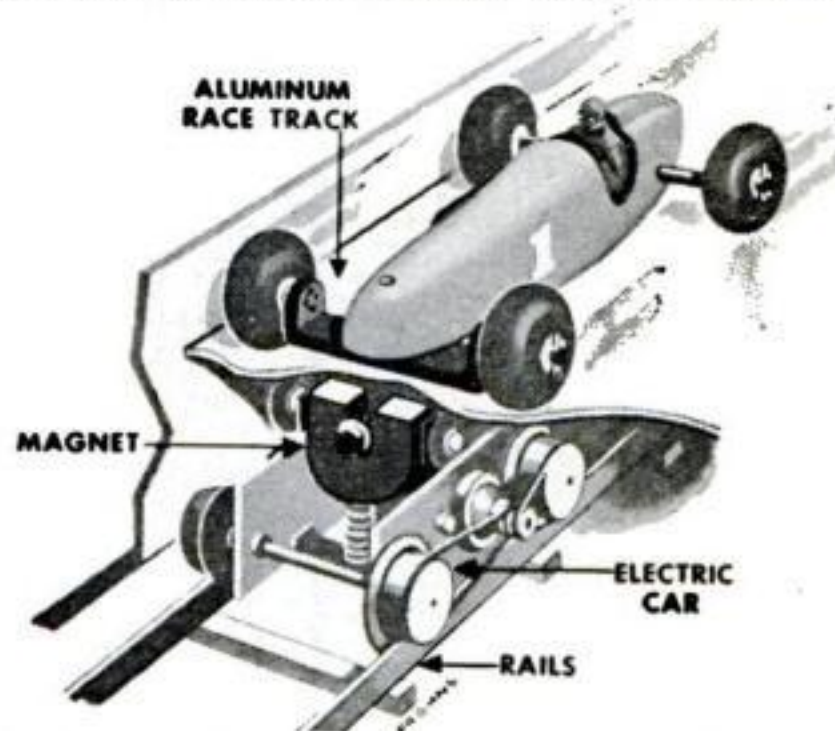


Scale models of big-time racing cars whizz by judges' stand at speeds up to 7 m.p.h.—

the equivalent, for their size, of 160 m.p.h. Cars and firetruck on infield only add realism.




**Crack-up occurs** when lead car skids on a turn. Racers have  $2\frac{1}{4}$ -in. wheelbase, solid rubber tires an inch in diameter. Speed is regulated by throttle knob for each car at end of table.



Each racer is pulled around the speedway, as shown in this cutaway view, by attraction of its front axle to a magnet mounted on an electric car that runs on rails under the track.

## ***Tiny Cars Race Like Big Ones***

A RETIRED auto racer has turned his old love into a parlor game that takes the same kind of skill as the real thing—and provides the same kind of spills and thrills.

He's Lou J. Fageol, of Detroit, who, with his brother Robeley, has patented the Jr. Midget Speedway  pictured above. Their R. D. Fageol Co. sells both the complete outfit—\$200—and kits for building your own racing cars.

Two people play the game on a table about half the size of a table-tennis court, with a third as judge to call fouls, count the laps, and time the races.

The trick is to take the curves fast enough to win but not so fast your car skids. That happens when centrifugal force overcomes the force of the magnet pulling it around the track. Result: a spill—or, if your car gets in the way of the other, a foul.



# World's First Clam Farm

**By Lester David**

UNLIKE oysters, which have been cultivated commercially since the Romans planted the first beds in 100 B.C., clams have avoided domestication by hardihood and quick footwork.

Relatively quick, that is; for they can burrow but a few inches into mud or sand in the 12½ hours between low tides. Compared with an oyster's willingness and need to stay put for five years while growing from embryo to market size, this wanderlust and the existence of plentiful natural supplies were among the factors that discouraged attempts at clam planting—until this year.

Now, on the tidal flats of Cape Cod, the villagers of Barnstable, Mass., aided by scientists of the Woods Hole Oceanographic Institution, are tending the world's first clam farm.

The project was born of desperation.

For years the townsfolk of Barnstable had watched with dismay the gradual decline of their once-prosperous clam industry. The clam beds around the Cape, formerly treasuries of abundance, lay almost empty from years of digging. So, with long faces, the Selectmen of the village gathered at the Town Hall one day last year to discuss the problem. And out of the gloom came the suggestion: "Let's put it up to the boys at Woods Hole. There's nothing they don't know about marine life. Maybe they can think of something."

That something took shape early this year in the form of five 15-acre plots staked out on a mud flat washed by the salt tides of the Atlantic. One plot was plowed, the second spaded, the third raked, the fourth fertilized with a layer of sod and peat from the marshes, and the fifth left as it was.

Small clams for seed were imported from Boston harbor. There commercial clamming is prohibited because of polluted water, so



As seed clams were sorted by size, a hacksaw blade in board scratched each shell. Later, growth can be measured by the number of rings on shell that have appeared outside scratch.

they could be dug without violating the conservation laws that forbid removal of baby clams from most areas. The pollution didn't hurt them as seed, since live clams purify themselves in clean water.

Each of the new farm's five plots was seeded with 200 bushels of baby clams.

And now the clam farmers, and their scientific advisers, are watching and waiting. So far, the clams—which feed on tiny marine plants and animals—seem to be doing best in the fertilized plot. If the harvest bears out that indication, larger fertilized fields will be planted next year.

Meantime, at their present rates of growth in all the plots, the 1,000 bushels of seed clams are expected to yield 2,500 bushels of soft-shells for market this year. If they do, science will have done more than rescue the clam diggers of Barnstable from unemployment. It will have shown how barren tidal flats in many parts of the world can be farmed to feed hungry people.





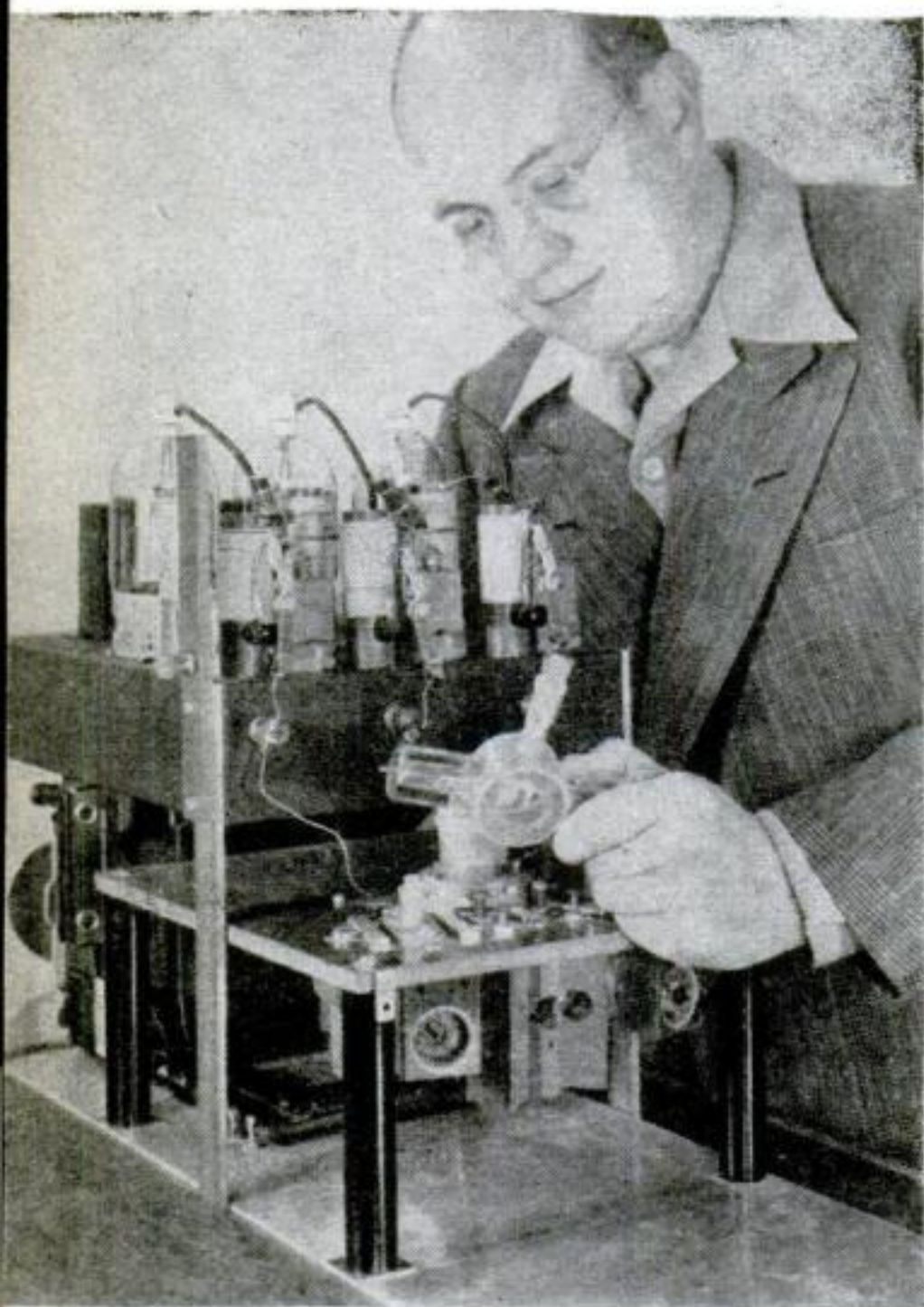
**Clams were planted** by scattering them over mud flat at low tide. By the next low tide, all but the largest had dug into the mud. Those were then buried by hand—and stayed alive.




**By trying different** ways of preparing each of five plots, "farmers" hope to find out what soil treatment is best to speed growth of clams and to keep them from wandering or washing away.



# Navy Camera Makes Light Look Slow



**Dr. A. M. Zarem holds a Kerr cell** in front of camera with which he uses it to take world's fastest pictures. Camera itself might be any standard type; here it's a Speed Graphic .

**Expansion of heated platinum wire**, in three pictures below, was photographed with setup shown at bottom of opposite page. Each exposure was  $1/25,000,000$  second. Same pulse

**N**O OBJECT can move as fast as light. So there's literally nothing worth photographing that cannot be stopped by a camera almost as fast as light. The U. S. Navy now has such a camera. In the time it takes to snap one picture— $1/100,000,000$  of a second—light travels only about 10 feet.

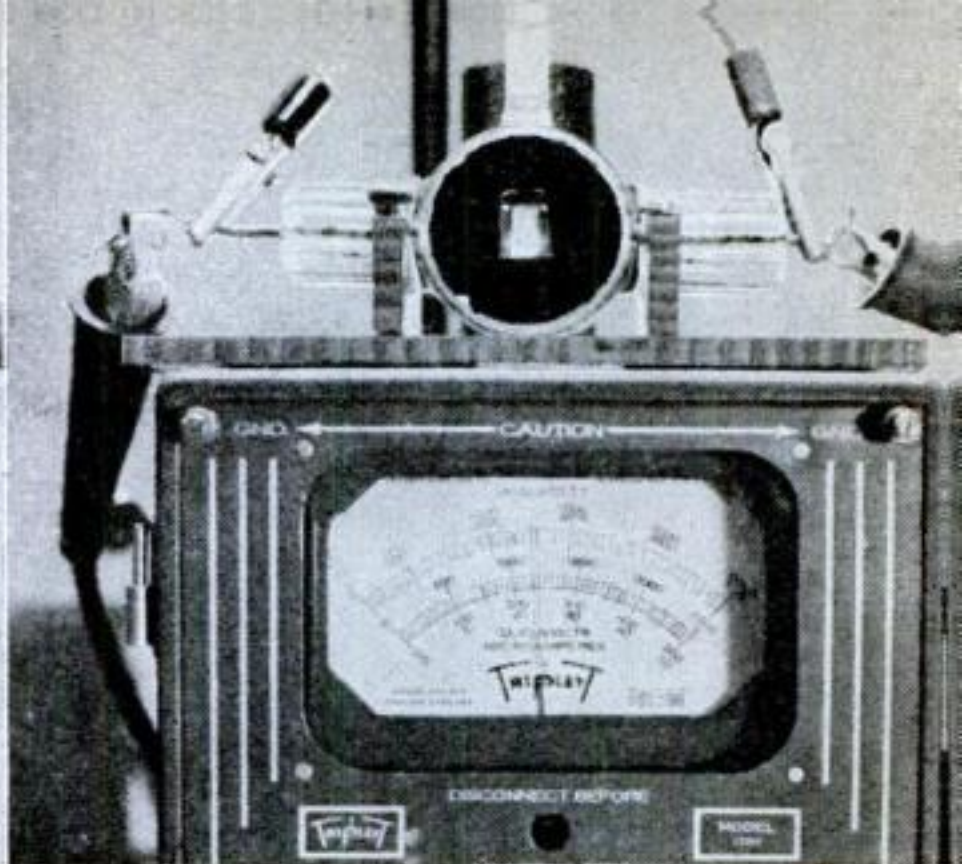
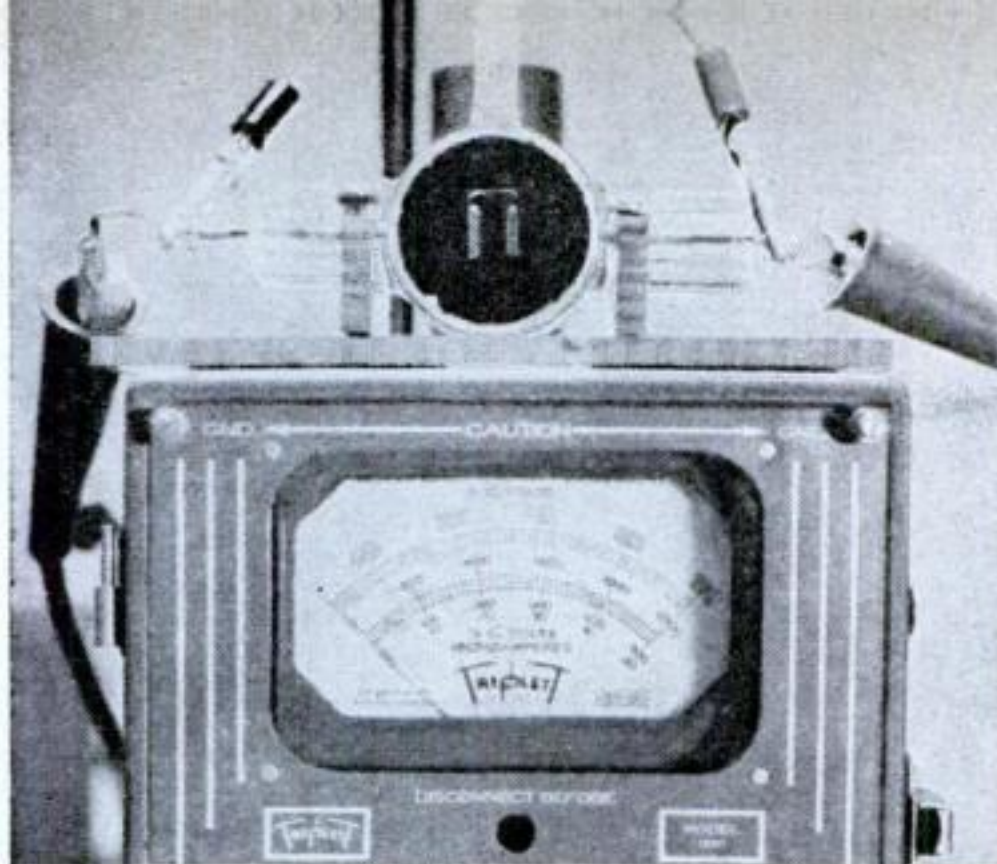
Pictures at this record speed are made with a shutter that has no moving mechanical parts—only moving molecules. These are in a Kerr cell: a glass tube filled with nitrobenzene, an oily liquid with a bitter-almond odor. When the nitrobenzene is shocked by a high-voltage current, its molecules line up in a way that changes the polarization of light passing through the cell. This effect was discovered back in 1875 by John Kerr. Now Dr. A. M. Zarem, of the Naval Ordnance Test Station at Inyokern, Calif., has made the Kerr Cell into a camera shutter.

The camera has three polarizers: two ordinary polarizing sheets, set "crossed" so that no light can pass through both, and, between them, the Kerr cell. When a high voltage hits the Kerr cell, it changes the polarization of light from the first polarizing sheet so that it *can* pass through the second—and register on the photo film.

Since the molecules stay lined up only as long as the high-voltage pulse lasts, a very short pulse lets light pass through for only a very short exposure.

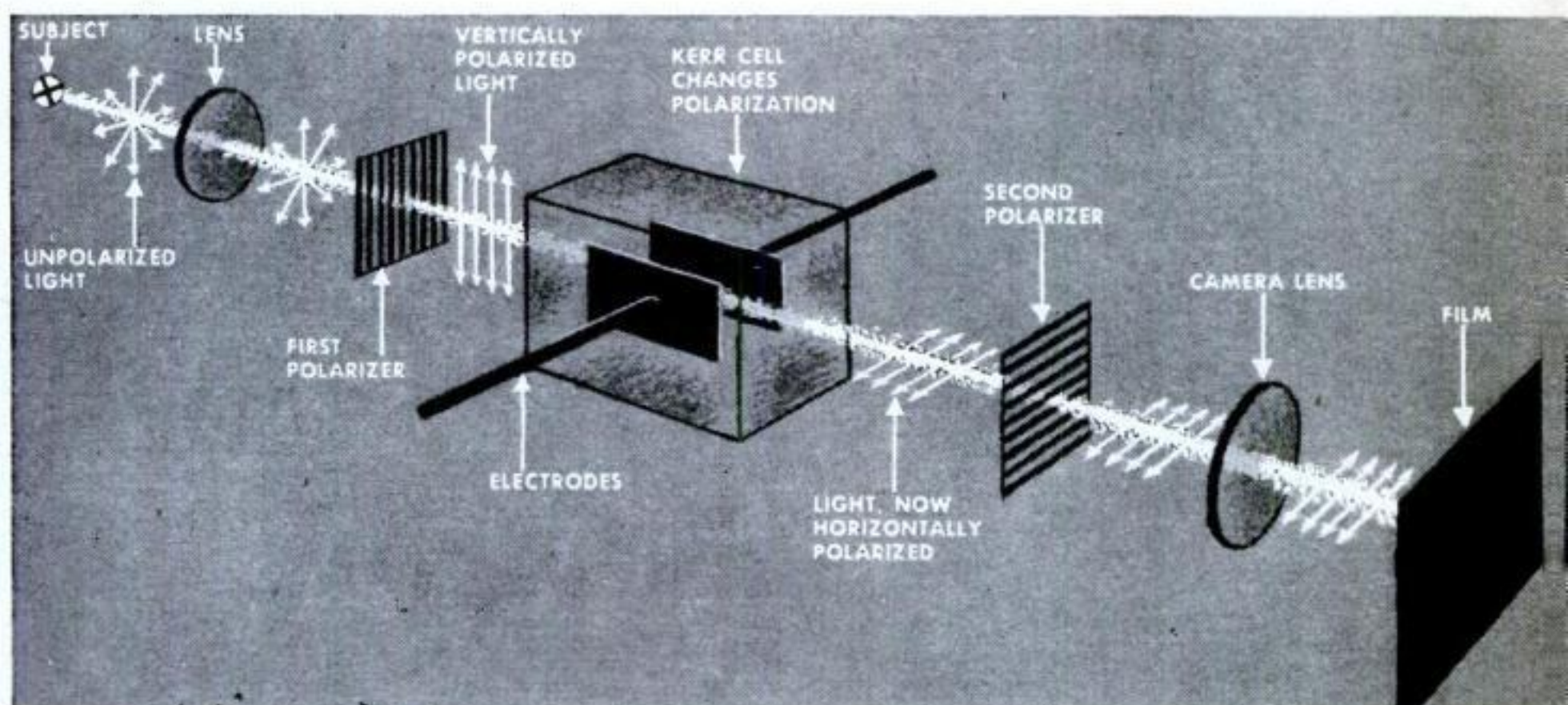
went to all three Kerr-cell shutters, but over cables differing in length by  $2\frac{1}{2}$  ft. Electricity crosses  $2\frac{1}{2}$  ft. of cable used in  $1/10,000,000$  second, so photos are  $1/10,000,000$  second apart.





**Demonstration** shows that Kerr-cell shutter (dark circle on top of voltmeter) lets light through only when current is on. At left: no

voltage, no light visible through shutter. But when current is on (right), cell shifts polarization of light and lets it go through shutter.

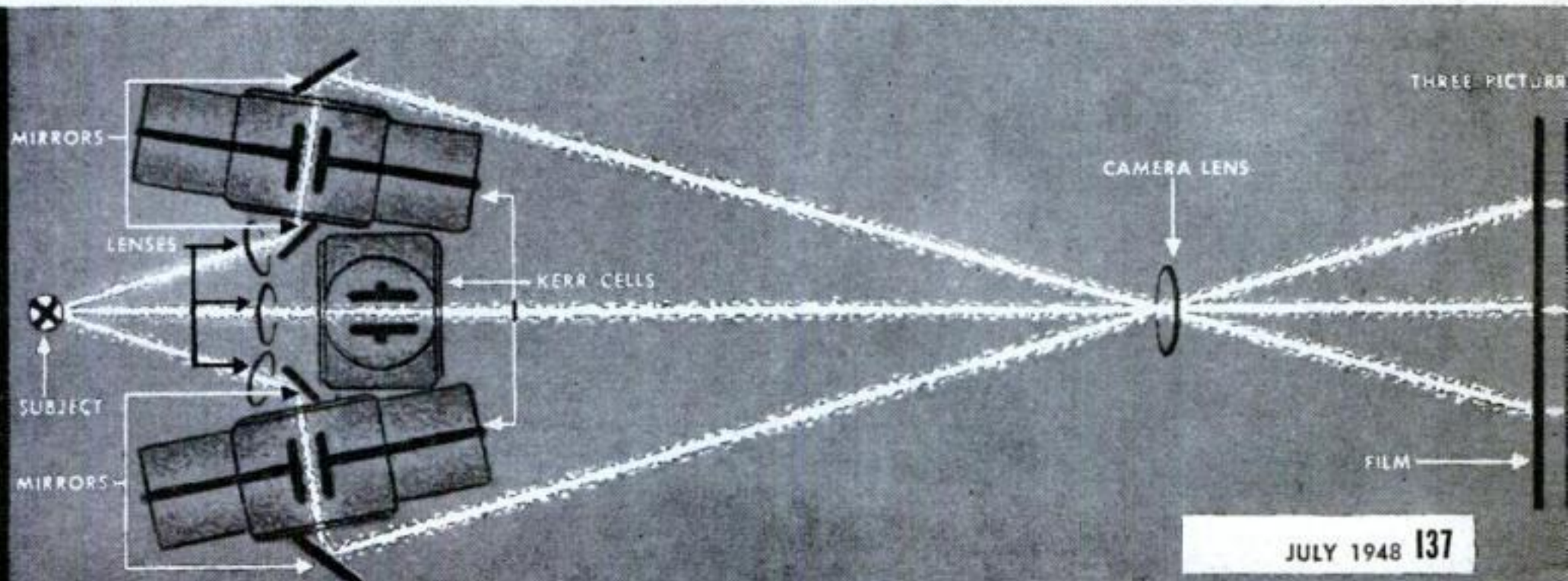


**Diagram** shows how polarizers work as shutter. Unpolarized light is like many-spoked wheel moving sideways. First polarizer, like picket fence, lets through only single pair of

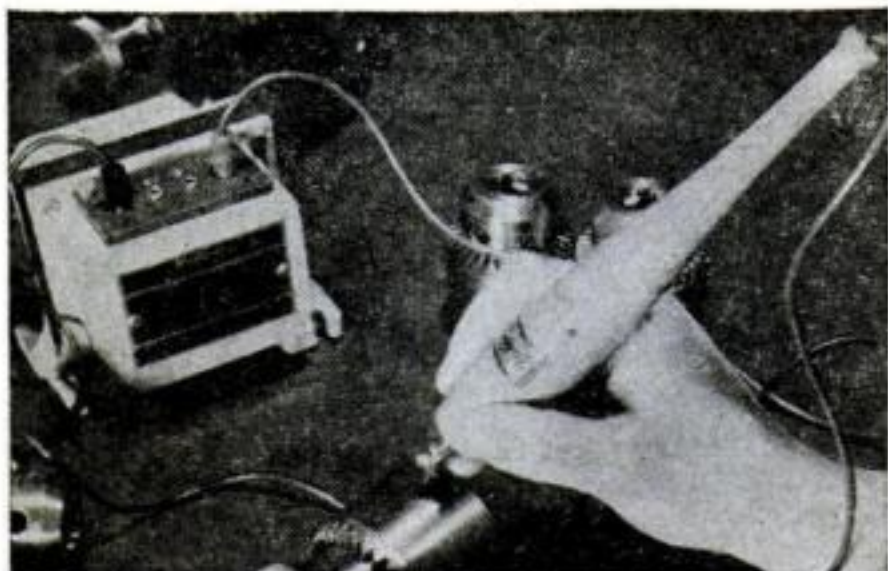
spokes parallel to pickets. But this pair won't go through second fence (second polarizer) because its pickets run wrong way—except when Kerr cell tilts spokes to line up with them.

**To make the "movies"** of expanding platinum wire, shown on opposite page, a series of Kerr-cell shutters was set up—one for each frame. Sketch below shows how the arrangement of

three cells and mirrors made three successive pictures of same action. In this way, photos can be taken that show step-by-step progress of nearly instantaneous events, such as explosions.







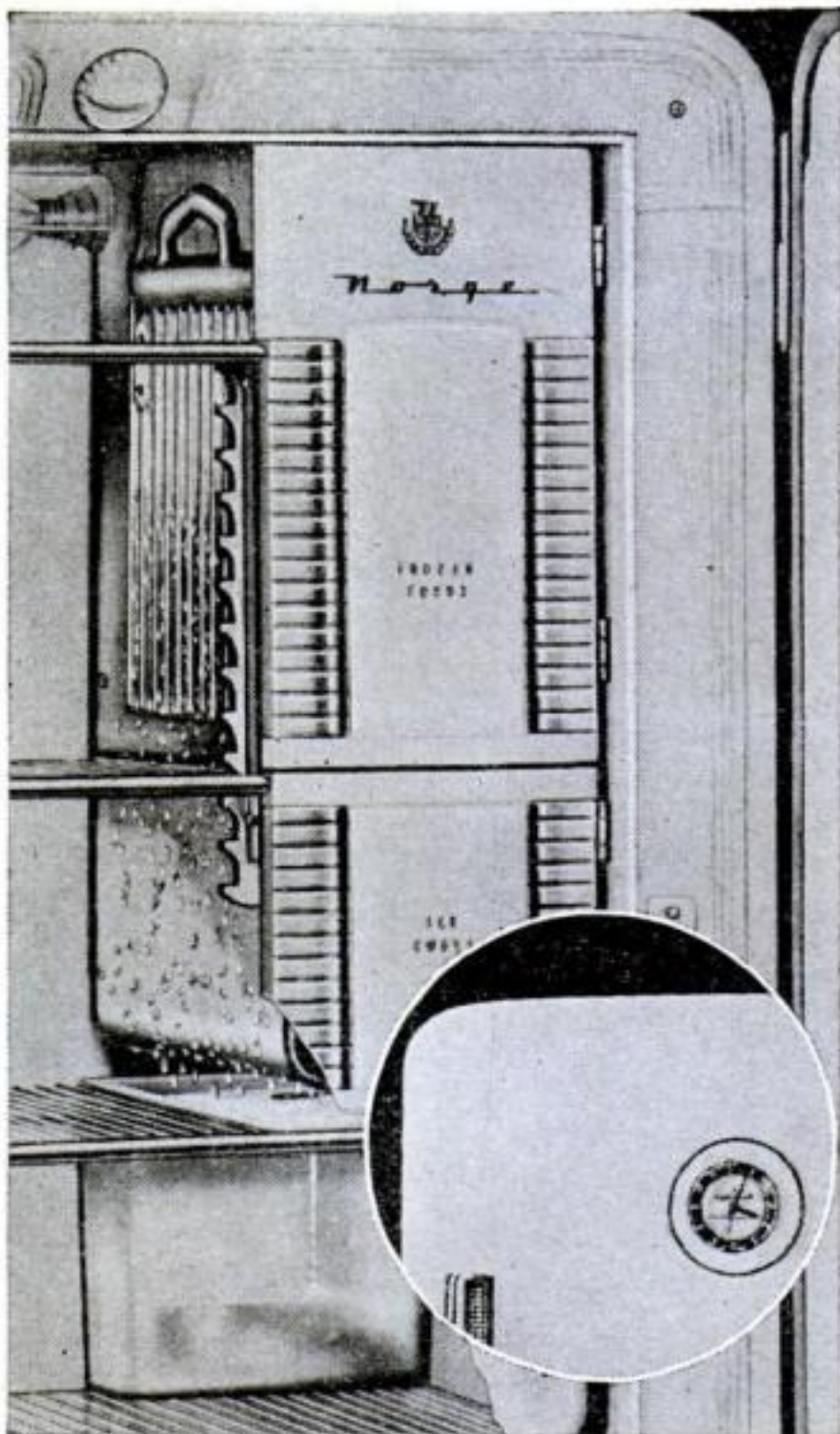
## Pen Writes on Steel

ELECTROMAGNETS in the handle of this new British pen, made to label steel parts, vibrate a spring tipped with an etching needle. Touching the point to the metal surface closes the circuit and sets pen going.



## Car Tags Show at Night

CONNECTICUT is the first state to cover its license plates with a new plastic film, called Scotchlite<sup>®</sup>, for better visibility at night. You can see the difference in this photo of the tag issued to the editor of POPULAR SCIENCE alongside an old-style marker. Tiny glass beads in the film reflect light from approaching automobiles.



## Refrig Defrosts Itself

AN ELECTRIC clock (inset) in the door of the new Norge refrigerator turns it off for three hours every night. This saves electricity, as well as time and muss, since ice melts off the freezer before it can build up into an insulating coat. Water drains into a deep tray that fills up only once a week and is easy to empty without spilling.

## Bus Has Buffet

LUNCH counters with steward service (right) in buses now save stops for snacks between meals on cross-country runs. American Buslines has put the new motor coaches on express routes out of New York, Chicago and St. Louis. Another feature to speed schedules is an airplane-type washroom in the rear of the bus, with toilet facilities and outlets for electric razors.





# You Can't Escape Cosmic Rays

So let's take an imaginary flight and meet more of these tiny bullets that constantly rain down on us.


**By Martin Mann**

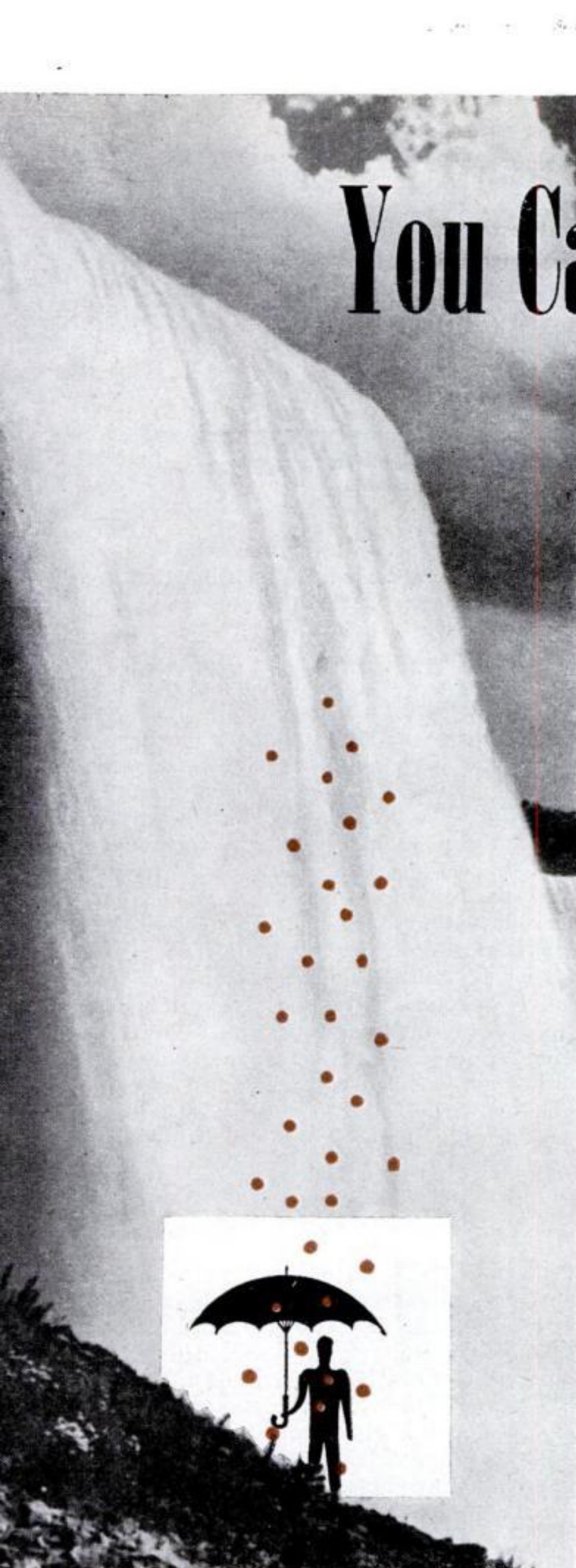
**Y**OU are sitting in the rain right now—a rain of atomic particles. You cannot see, smell, or feel them. But they are showering you and everyone else day and night, winter and summer.

They are cosmic rays. Although they were discovered about 35 years ago, scientists have only recently learned just what they are and a little about what they do. No one knows yet exactly where they come from.

Although these powerful cosmic particles pass through your body every second of your life—and they are much like the particles that come from an exploding atomic bomb—they apparently do not hurt you. The medical men reason that the human race, during many centuries of exposure to this much radiation, has become adapted to it.

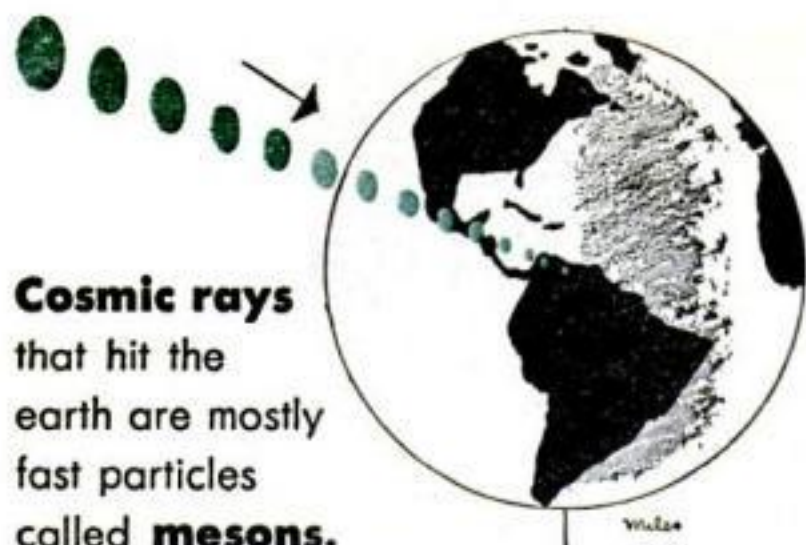
Cosmic rays, while very powerful individually, are spread out more thinly than the radiation from an X-ray machine or the horrible new bomb. They are comparable, in fact, to the drops of rain that fall at the start of a summer shower—heavy, but widely spaced.

Recent experiments with mice indicate, however, that cosmic rays may not be quite as harmless as most of the experts have thought. At the University of Maryland Medical School, Dr. Frank H. J. Figge arranged eight cages of mice so that they received varying amounts of cosmic radiation. Some of the cages were covered with lead plates, because lead intensifies these rays. 



Like droplets in a waterfall, atomic particles cascade to earth from outer space in a continuous shower, splitting as they collide.



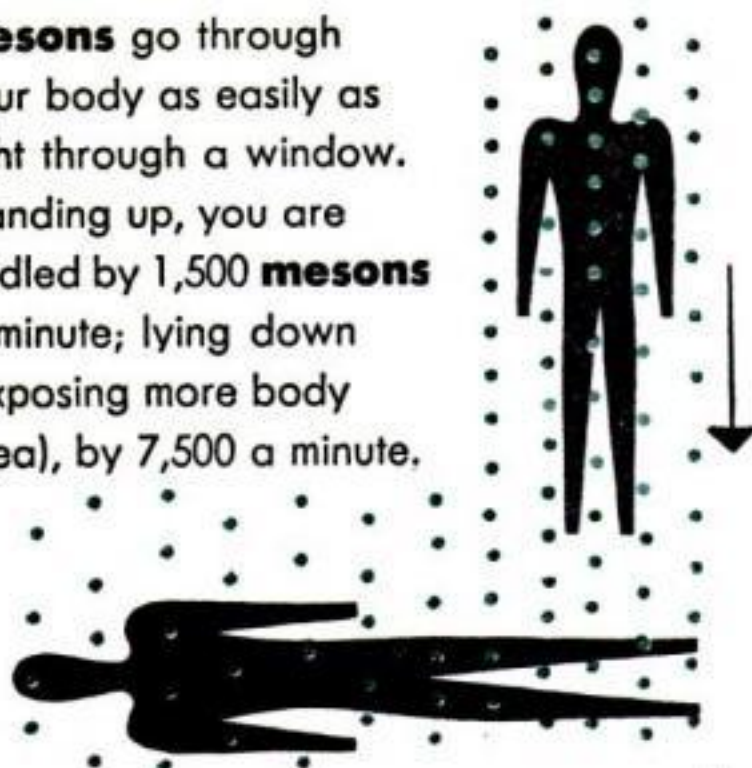


**Cosmic rays** that hit the earth are mostly fast particles called **mesons**.

At sea level, an area this size  is struck by one **meson** every minute.

Other cages were not covered, so that the mice in them would receive only the normal amount of radiation. Dr. Figge then injected all the mice with methylcholanthrene, a chemical that induces cancer. In the cage receiving the most concentrated dose of cosmic rays, 21 of the 23 mice developed cancer in 10 weeks. In the worst of the uncovered cages, only 10 mice had

**Mesons** go through your body as easily as light through a window. Standing up, you are riddled by 1,500 **mesons** a minute; lying down (exposing more body area), by 7,500 a minute.



developed cancer during the same period.

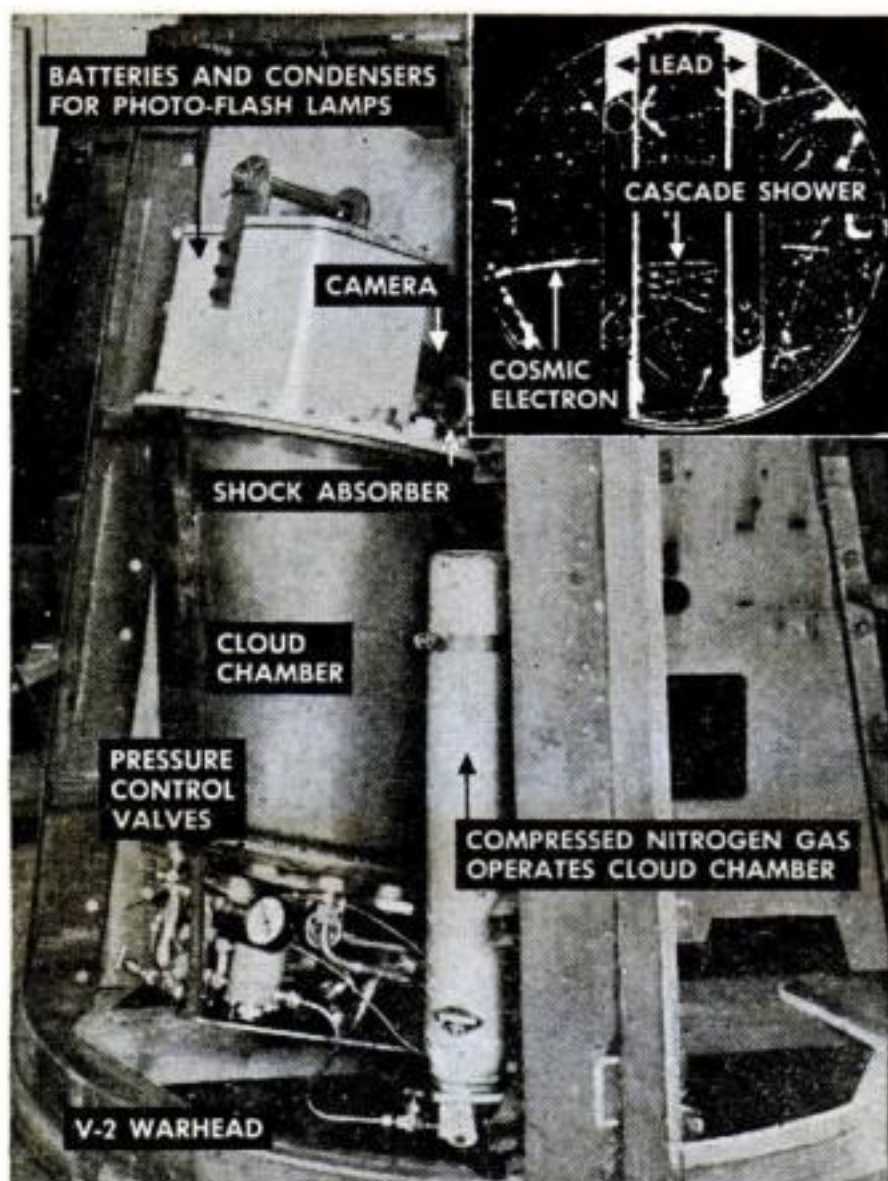
Dr. Figge is careful to point out that this one experiment only indicates something worth further investigation. It by no means proves that cosmic rays cause cancer.

There are ways in which the atomic particles from out in space certainly affect you. When they enter the upper part of the atmosphere, they transmute some of the nitrogen there into a radioactive form of carbon called carbon 14. It is just like the carbon 14 that is manufactured now in atomic piles. But this carbon 14 is present in the air you breathe (as part of the carbon dioxide), and gets into your body and stays there. Nobody knows whether this hurts you.

Such recent discoveries as this may turn out to be merely interesting tidbits of knowledge, with no practical value. But other things learned from cosmic rays already have proved tremendously important. Some of the knowledge that enabled physicists to produce the atomic bomb was acquired by studying cosmic rays. So they are being studied a lot more now, and there's no telling what will come of this work.

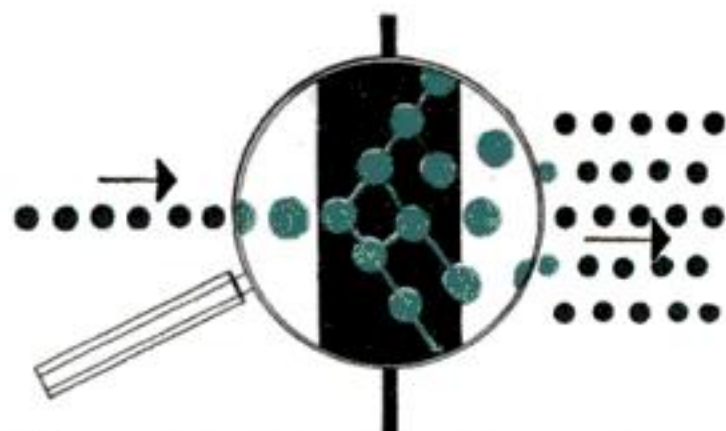
Suppose we take an imaginary trip—a very imaginary trip—into space to observe this mystery with the scientists. Since we cannot see cosmic rays, we will take a cloud chamber with us. It's a device with which the particles can be tracked and identified. We'll also take a Geiger counter to count the rays. Our guide on this strange tour will be Dr. Walter Heitler, cosmic ray expert from the Institute of Advanced Studies in Dublin, Ireland, who is now a visiting professor at Columbia University.

Dr. Heitler suggests that we follow the rays down through the atmosphere as they approach the earth. All right, let's keep our

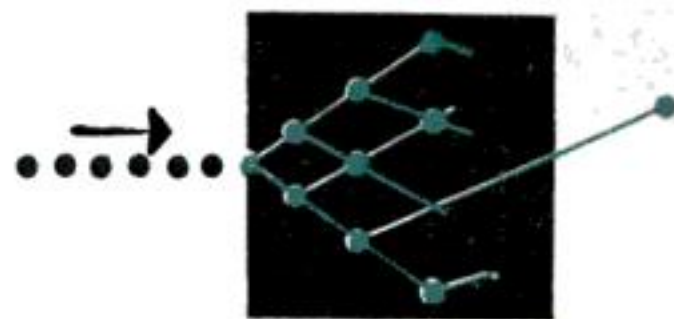


**War-built V-2 rockets** have become a major tool in cosmic-ray research, taking instruments like this Naval Research Laboratory cloud chamber to new heights. Unit shown above photographed cosmic ray tracks every 25 seconds on a 98-mile flight. Inset shows one of pictures it made. They were recovered from film cartridge that had buried itself six feet into ground.





Thin metal plates intensify cosmic rays by the **"cascade effect."** One meson gives a fast electron, which emits **photons** when it collides with a metal **atom**. The photons turn into **electrons** when they in turn hit atoms. Thus the number increases, but the energy decreases.



Thick metal plates cut down cosmic rays. At first, the **cascade effect** intensifies them, but these cascade showers die out inside the metal plate, lacking enough energy to continue the **electron-photon transformation**.

imaginary space ship going until it leaves the atmosphere, about 200 miles up. That is higher, of course, than anyone has actually traveled or even sent instruments. But scientists are pretty sure that out here, where the wide open spaces really begin, the cloud chamber will catch the tracks of protons (the positively charged particles found in atomic nuclei) and probably little else. Proton tracks can be distinguished from others in the cloud chamber because a proton is about 1,845 times as heavy as an electron and its track curves in the direction of positive charge.

These protons are the things that come from far away. Physicists call them the "primary" radiation. They come fantastically fast, with energies as high as a million billion electron volts. Even the new atom-smashing machines now being built (PS, Jan. '48, p. 113) will reach only one billion electron volts.

#### ***Bombardment Increases Near Earth***

Now let's follow these high-powered protons down to see what happens when they smash into the earth's atmosphere. The air does not become thick enough to make much difference to the protons until they're down to within about 34 miles of the earth. Near that point, however, our Geiger counter begins to click faster, recording an increasing number of rays. And the tracks of different kinds of particles appear in the cloud chamber. Our space ship is now being bombarded not only by protons but also by electrons and neutrons—two other components of ordinary atoms—and by several mysterious particles called mesons or mesotrons.

Dr. Heitler explains that in this part of the atmosphere there are enough atoms of

air—oxygen and nitrogen—to get in the way of the high-speed protons from outer space. As protons bang into these atoms, they knock loose their outer clusters of electrons. And some of the protons may penetrate to the nuclei of the air's atoms and smash them open, turning loose the protons and neutrons in their interiors.

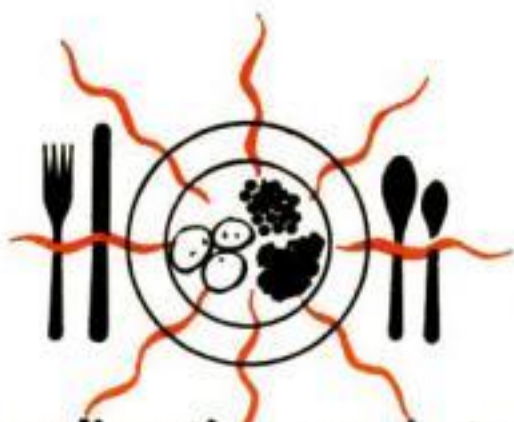
#### ***How Mesons Are Born***

The mesons, however, are actually created rather than blasted out of something already existing. A high-speed proton passing close to a neutron, loses some of its speed energy. This speed energy is converted into mass (it's as though an atomic bomb worked backwards), and a negative charge from the neutron hooks onto the new mass. Where originally there were two fast particles, a proton and a neutron, there are now three: a slower proton, a proton made from the old neutron, and a meson.

Mesons may also be created by collisions between two protons, yielding a meson, a proton, and a neutron. And scientists have found, furthermore, that there are several different kinds of mesons. The first type discovered weighed about 200 times as much as an electron. In the last few months, however, mesons that weigh 350 and 800 times as much as an electron have been found, and the physicists expect to turn up still other varieties. These mesons can have a single negative charge (like an electron), a single positive charge (like a proton), or be neutral (like a neutron).

As we ride down through the atmosphere in our imaginary space ship, the Geiger counter clicks faster and faster. More and more of the primary protons are being stopped by atoms of air, and more and more

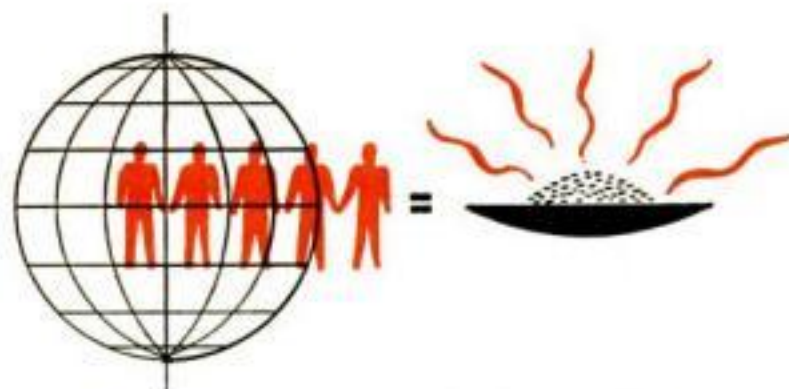




You eat **radioactive meals** because of cosmic rays. Radioactive carbon, produced from the air's **nitrogen** by cosmic rays, is in all animal and vegetable carbon.

electrons, protons, neutrons, and mesons are appearing around us. This secondary radiation, in turn, creates more cosmic rays. The secondary protons, you see, produce the whole list of cosmic particles, just as the primary ones do. And the neutrons and mesons can also ionize and break up atoms.

But Dr. Heitler calls our attention, as we descend, to some new kinds of pictures in the cloud chamber. One type shows the death of a meson. Mesons, like radium and similar substances, are radioactive. They decay into an electron and a neutrino (a



But a little **radioactivity** doesn't seem to hurt us. The normal human body even contains some **radium**. There's more than half an ounce in the world's total population.

neutral electron) after a lifetime of only about two-millionths of a second.

These decay electrons travel very fast, and they cause the second new type of picture in the cloud chamber. This picture looks like a heredity chart—the streak of a single electron branches again and again until there is a host of new particles. This is called cascade radiation.

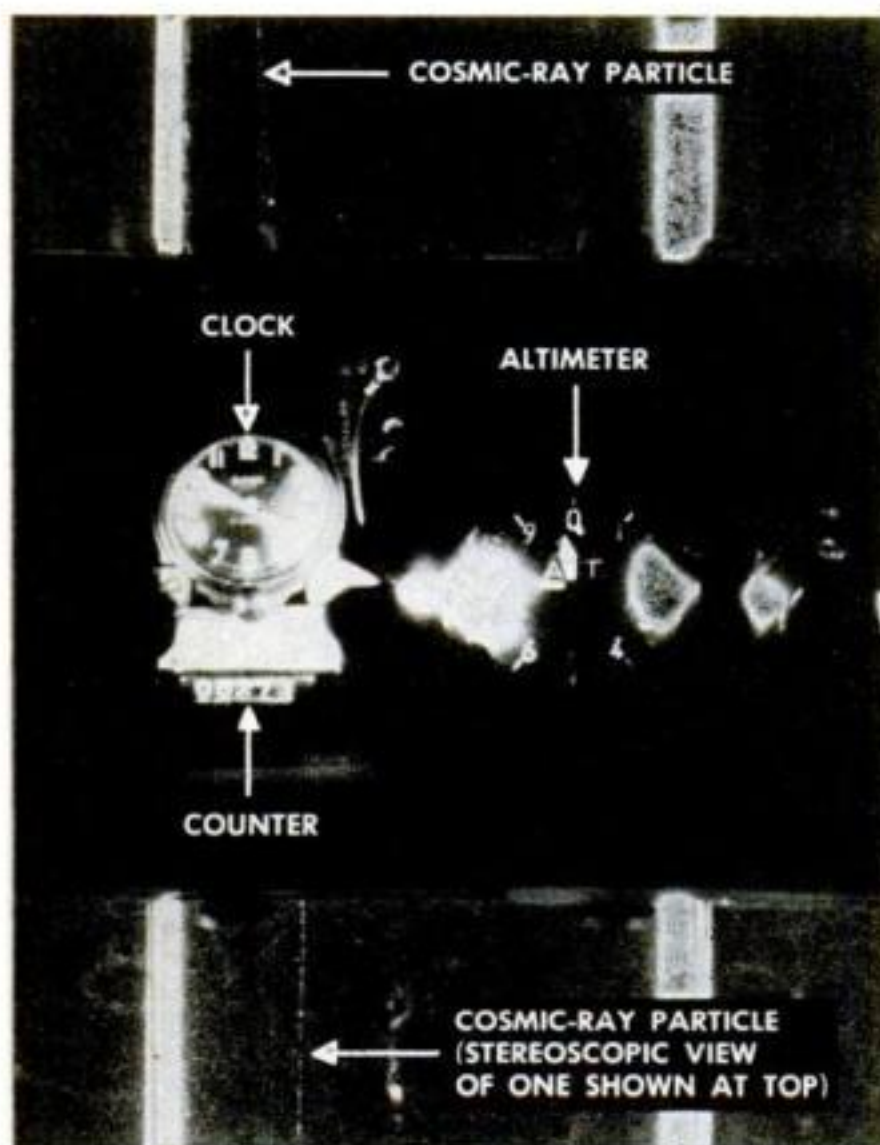
#### *Mass into Energy—and Back*

In a cascade, a high-energy electron hits an atomic nucleus and emits a photon, which is a tiny package of pure light energy. Photons consist of energy alone and do not have weight like other particles. When they hit atomic nuclei, they change back into electrons. Then those electrons emit more photons, and so on and on.

These processes fill the sky with particles of all kinds. This shower from the heavens is thickest, however, about 12 miles above the earth. As our space ship moves down lower than that, Dr. Heitler points out that the Geiger counter registers fewer and fewer particles because the atmosphere is becoming dense and the cosmic energy is thinning out. By the time we reach the earth, the tremendous energy originally present in the primary protons has been divided and redivided so many times that relatively few individual particles are powerful enough to continue through the air, and the Geiger counter clicks only a few times a second. Most of these clicks are caused by mesons.

If we unloaded the Geiger counter and cloud chamber and carried them down into a coal mine, Dr. Heitler adds, we would find that the cosmic rays lessened as we descended, because the earth too absorbs them. About a mile below ground, the rays would disappear almost completely.

Learning these things has taken a long



**New cloud chamber** developed by Dr. Robert B. Brode of University of California makes pictures like one above. Top and bottom sections are stereoscopic views of track of same cosmic particle, permitting measurement of track's inclination. Center part shows clock, instruments.





The human body also has about 10 ounces of **potassium**, in which foods like these are rich. About one part in 1,000 of this is naturally radioactive "**potassium 40**".

time, much expert craftsmanship, and some very fancy head-scratching. About 50 years ago, when Becquerel and the Curies found that certain elements were radioactive—that is, that they emitted strange particles—scientists began to look for radioactivity in whatever was handy, even the air. They found it, too. So they supposed that there was a trace of some radioactive substance in nearly everything—the earth, air, water, buildings, and so on.

Then a couple of very inquisitive fellows, V. F. Hess of Austria and W. Kolhorster of Germany, sent their instruments up in a balloon. They reasoned that the radiation detected should diminish as the balloon went farther away from the earth. But it didn't. The higher the balloon rose, the more intense the radiation became. So there was only one plausible explanation: the radiation came from somewhere out in space.

A Japanese physicist, Hideki Yukawa, was responsible for the next big advance, though not working on cosmic rays at the time. He was trying to figure out why the nucleus of an atom stays in one piece. His computation of the force necessary to hold it together revealed that it was a type of force that could be represented by a particle. That particle, he said, should weigh about 200 times as much as an electron, have a single negative charge, and last only a few millionths of a second.

So the cosmic-ray experts began looking for such a particle, and Dr. Carl D. Anderson of the California Institute of Technology soon found it. Dr. Yukawa had forecast the existence of mesons.

The most recent discoveries resulted indirectly from World War II. Two of the deadliest weapons ever devised, the B-29 plane and the V-2 rocket, enabled the physicists to measure cosmic rays at altitudes



So **radiocarbon** from cosmic rays makes the third radioactive substance in the body. It produces less radiation than the **potassium 40** but more than the **radium**.

higher than were previously attainable.

Flights by Dr. Anderson in a B-29 made a pretty sure thing out of what had been a strong suspicion: the basic radiation from out in space is almost exclusively protons. And V-2 experiments directed by Dr. James A. Van Allen of Johns Hopkins University settled another years-old question: where does the cosmic-ray intensity level off? A 100-mile flight last July finally pegged this point at 34 miles up.

#### *More Puzzles to Solve*

There are still a lot of cosmic-ray puzzles for smart young men to answer. The most intriguing is the problem of where these rays come from. Most scientists believe they come from far outside our solar system—maybe some place in the Milky Way. There are other theories, too, such as the "solar cyclotron" proposal of Winfield W. Salisbury, research director of the Collins Radio Co., and Dr. Donald H. Menzel, Harvard astronomer. They suggest that the movement of atoms in the sun generates very long radio waves. These radio waves then accelerate particles that exist in space near the earth—in much the same way particles are accelerated in a laboratory cyclotron.

But more evidence is needed. How long it will take the scientists to obtain it no one knows. But the planes and rockets that may help them tremendously are being developed now. Scientific progress, like cosmic radiation, is overtaking us day and night, winter and summer.

END

#### **Chew a Stick of Penicillin**

CHEWING gum containing penicillin and sulfa is now being prescribed for patients who are allergic to the drugs in capsule form or by injection.



# ***New Slabs Speed Building, Cut Cost***

**W**HEN wood for building was scarce during the war, a Swiss chemist got a bright idea for stretching the supply: soak waste chips and shavings in chemicals, mix the shredded fibers with Portland cement, and press the mixture into slabs, panels, and blocks. The new material was widely used in Europe for houses, factories, and hospitals. Now it's being made over here.

Durisol®<sup>®</sup>, as it's called, combines the

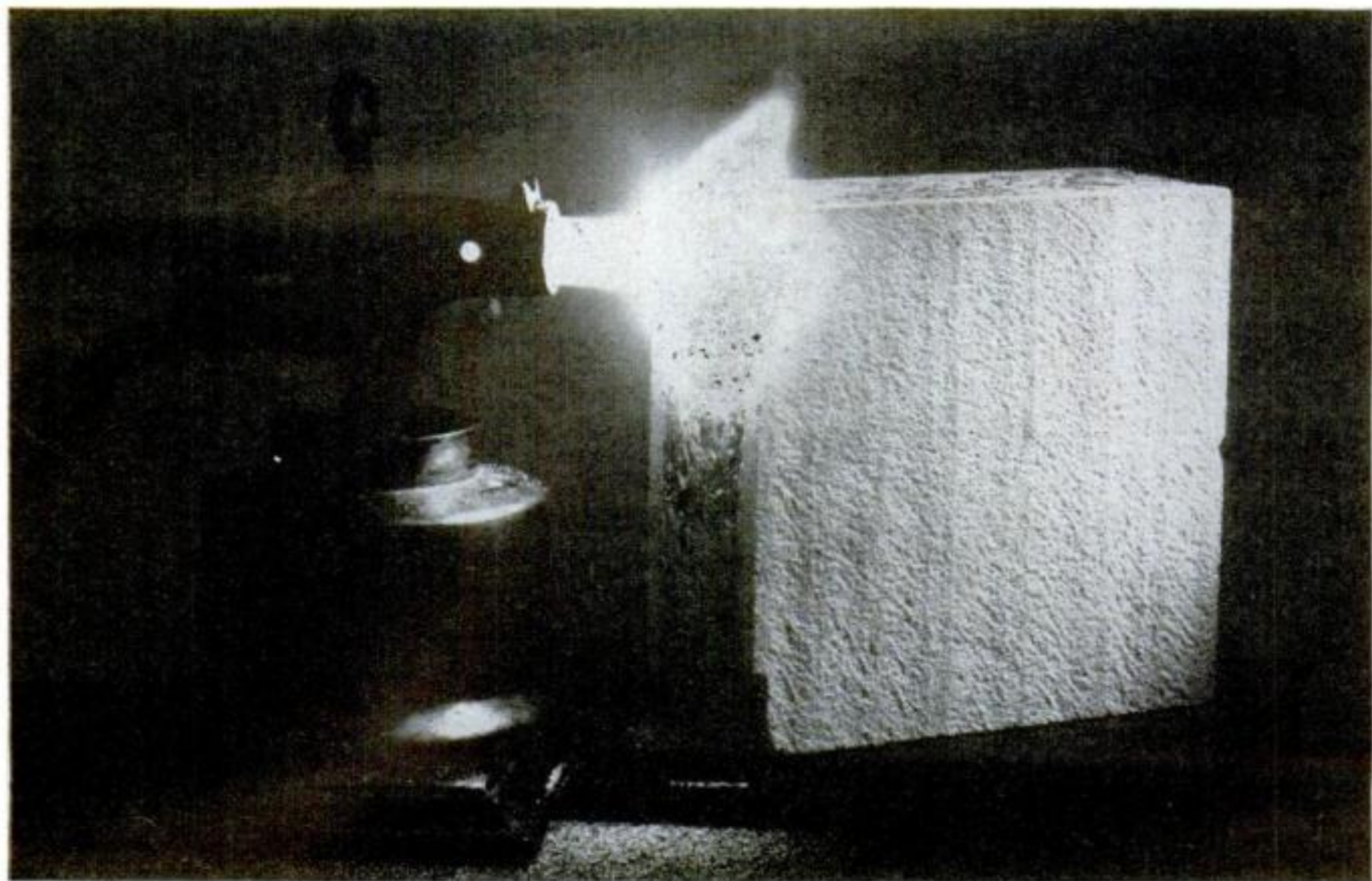
characteristics of sheathing, siding, fire-proofing and insulating material, and lath. Used for interior or exterior walls, it needs only half the usual number of studs; for partitions, where less strength is needed, it can be put up without framework and plastered over. It also makes subfloors, ceilings, and roofs. Its use is said to cut building time in half and, by saving labor and lumber, to trim costs 20 percent.



**Durisol®** slabs for making walls are 2 ft. by 4 ft., and 3½ in. thick. Strip of felt in tongue-and-groove joint makes it watertight. Panels and blocks for other uses are 1 to 5 in. thick.



**House in Belgium** has exterior walls of Durisol® panels, pre-coated with white cement plaster as a permanent finish. Uncoated, they'll hold plaster or stucco without the use of lath.

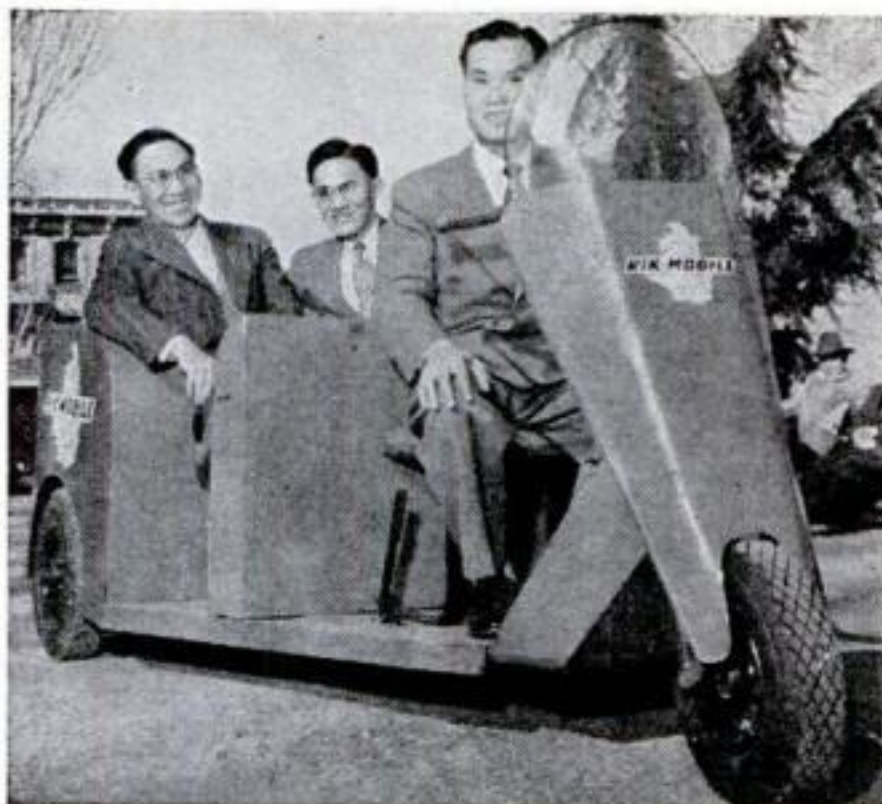


**Durisol®** resists fire, as shown in this blowtorch test. It also absorbs sound, stops rats and

termites, insulates five times better than bricks. It can be sawed, drilled, nailed, or screwed.



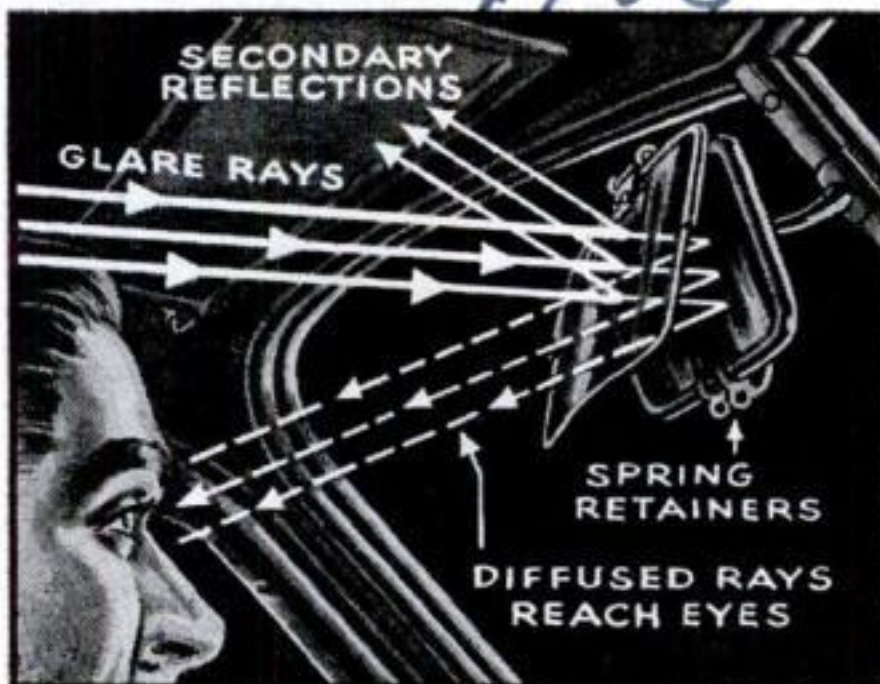
5285



### Rickshaw On Way Out?

IF THIS three-place motor scooter catches on, the boys who pull rickshaws will push throttles instead. The first model of the Rik-Mobile ® has been shipped to China for demonstration before the rickshaw associations. Developed by the China Engineering Corporation, of San Francisco, the machine is steered by motorcycle-type handlebars. Gas control is on the right-hand grip, clutch and brake in the conventional positions on the floorboard. The Rik-Mobile hits a top speed of 35 m.p.h. and does about 80 miles on a gallon of gasoline. Two speeds forward are provided.

4484



### Filter Stops Rear-View Glare

A FILTER that clamps over a rear-view mirror eliminates the glare of headlights from behind. The Edro Corporation, New Britain, Conn., makes the device of neutral-color plastic. It fastens to the mirror by four adjustable hooks. When not needed, it's easily swung up out of the way. The filter permits a normal view to the rear.

5251



### One Wipe Whips Foggy Glass

ONE wiping with this new chemically treated cloth is said to keep the windshield and windows of a car fog-free for several hours. The cloth lasts indefinitely.

Developed by the Dupont company, the antifogging agent is a solution of tannic acid, glycerine, water, and dye. The treated cloths are manufactured by the Industrial Products Company, of Philadelphia. Soft absorbent cotton cloth is soaked in the solution and then allowed to dry.

Tests have shown that the cloth also may be used to prevent eyeglasses from steaming up when you enter a warm building.

5291



### Taillight Hides Gas-Tank Cap

A FEATURE of the 1948 Cadillac is the gas cap, taillight, and directional signal—all built into one unit in the left rear fender, matching one of similar appearance on the right. The tank inlet is concealed beneath the light. To get to the tank opening, you push a button as shown in the photo. This allows the light to be swung up.

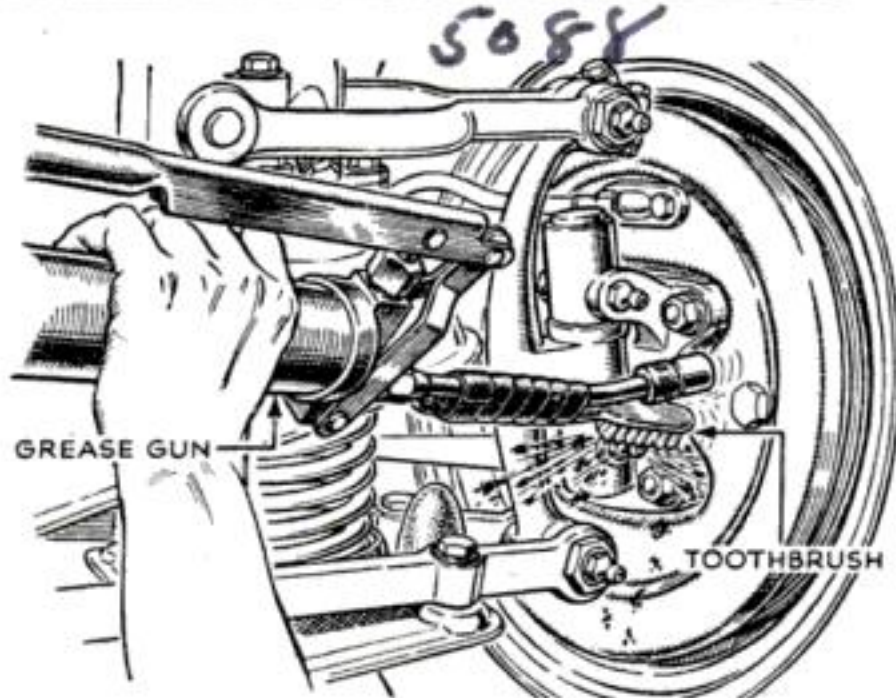




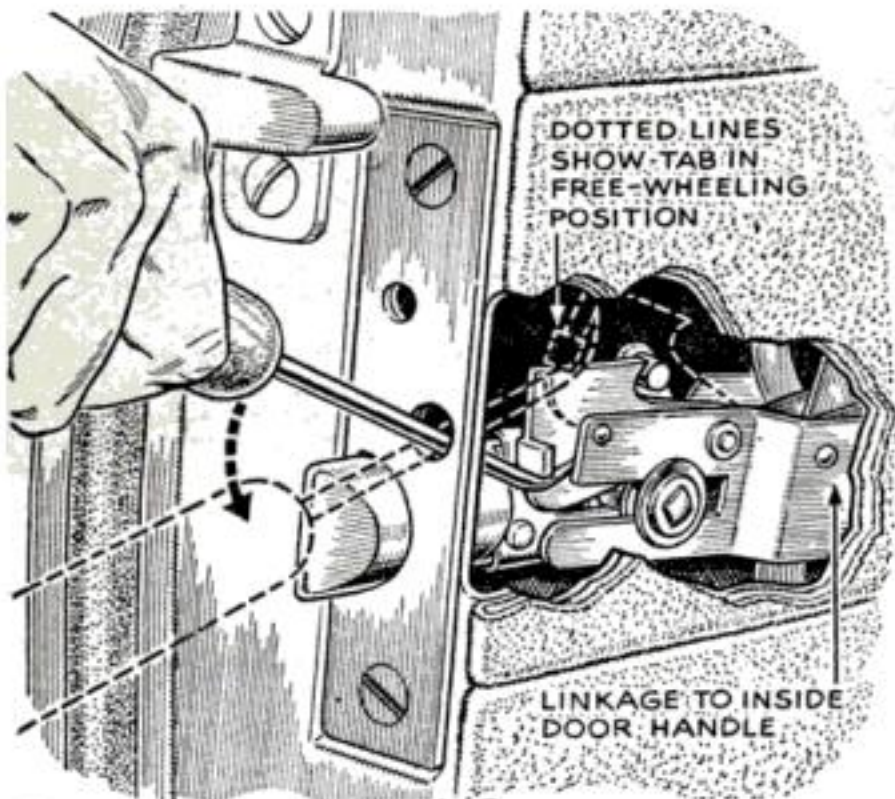
# Hints From the Model Garage



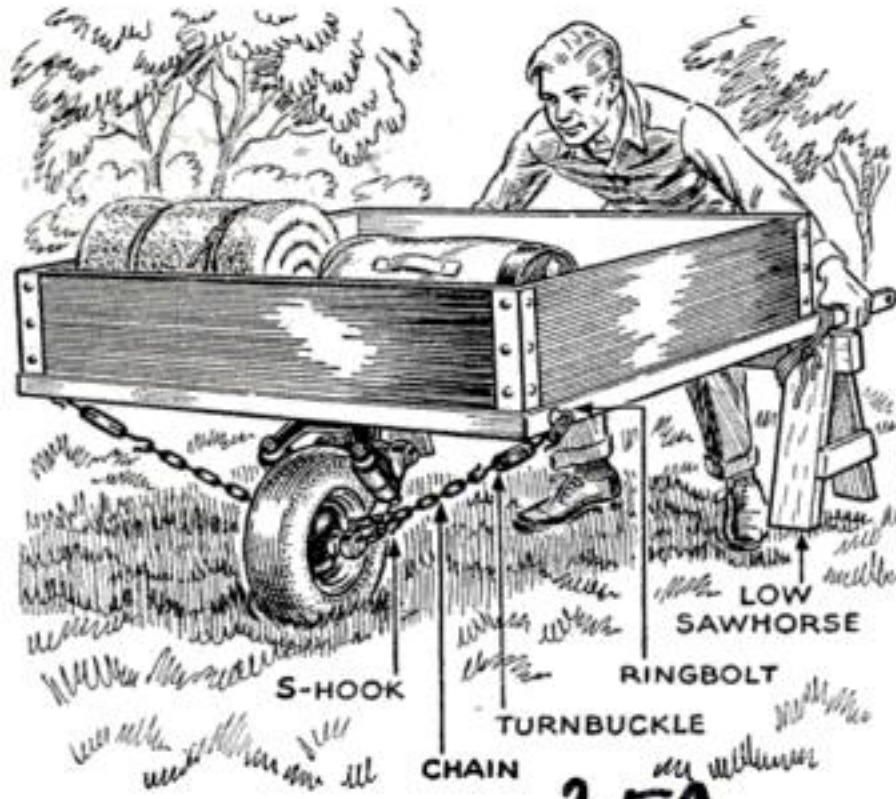
**Washing Job Speeded Up.** You can do a better job of washing a car if a sponge is attached to the nozzle of the hose. Cut a blind hole just large enough for insertion of the nozzle. Run heavy cord through with a needle and tie to the hose.



**Brush Off the Fitting.** An old toothbrush with stiff bristles is ideal for cleaning grease and embedded dirt from grease fittings before applying the gun. For greater working convenience, tape the handle of the brush to the nozzle of the gun.

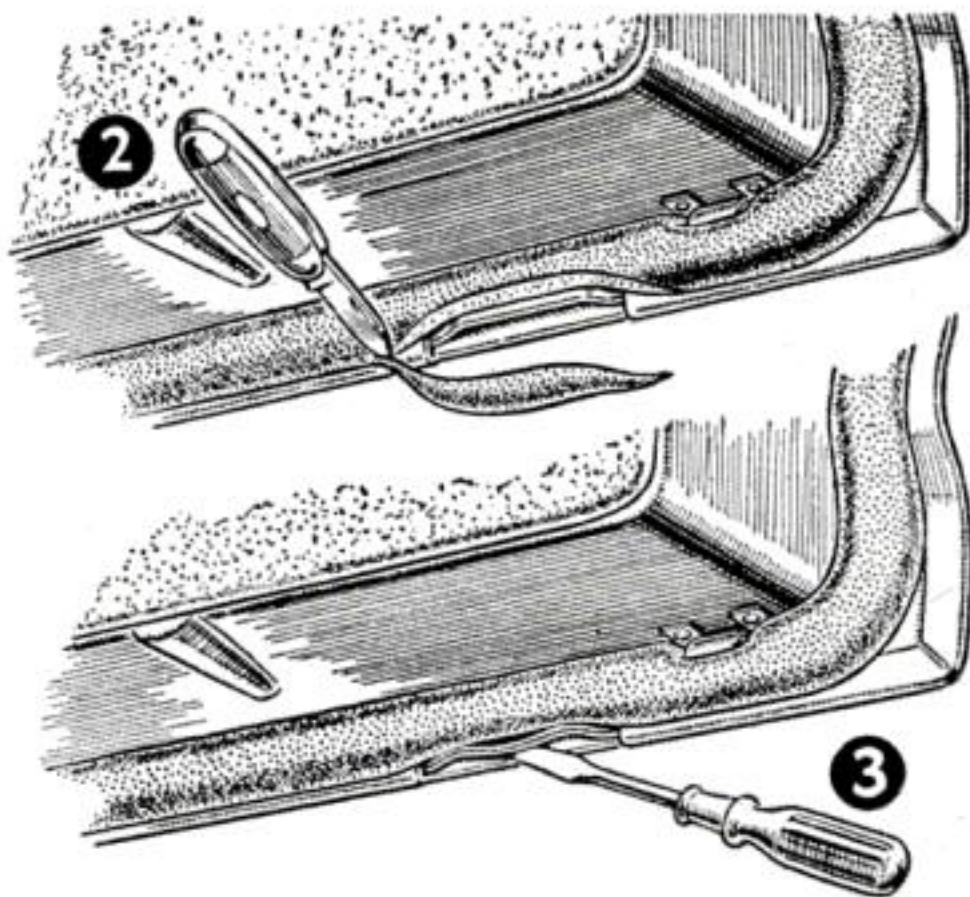
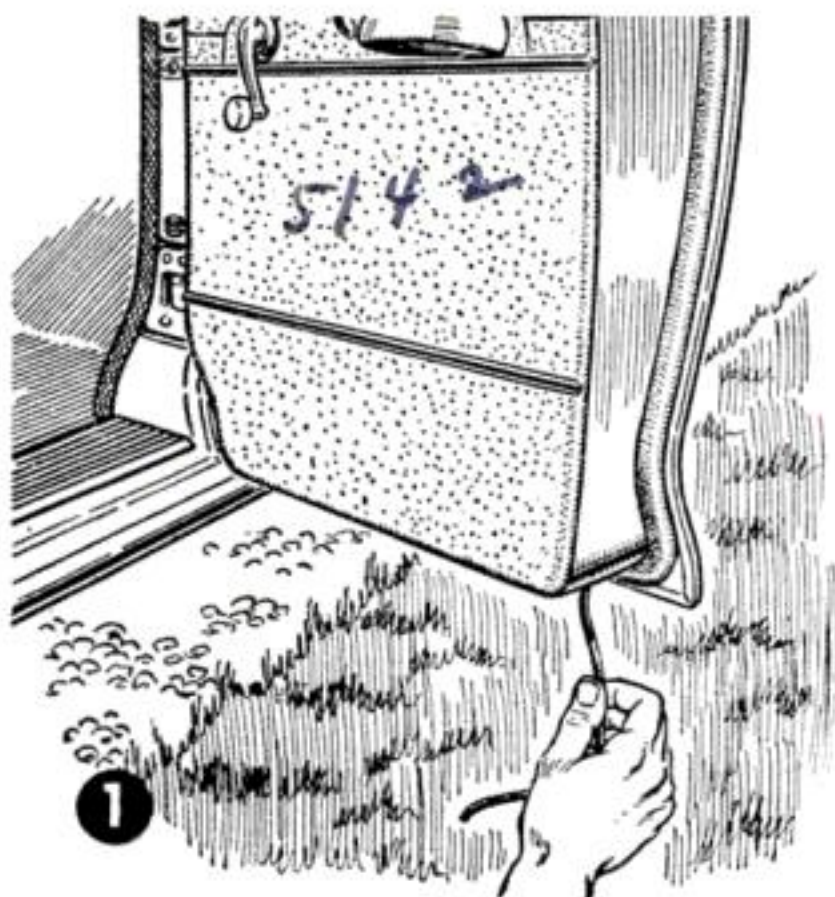


**Keep Children Safe.** Did you know there's a safety feature in the rear doors of General Motors four-door sedans? With a pointed tool (for instance, an ice pick with the point slightly bent), you can adjust the lock so the inside handle won't open the door. The handle is as easily returned to operation. GM introduced these locks in 1941. They've been used ever since in all models except '46, '47, and '48 Buicks.



**Trailer Used as Wheelbarrow.** It's difficult to handle a caster-type trailer when detached from the car. F. W. Sewell, of San Mateo, Calif., overcame this by rigging his like a wheelbarrow. A ringbolt was attached to the body at each side. When the trailer is to be moved, removable chains with S-hooks in each end keep the wheel rigid. Turnbuckles tighten the chains. A sawhorse supports the trailer.

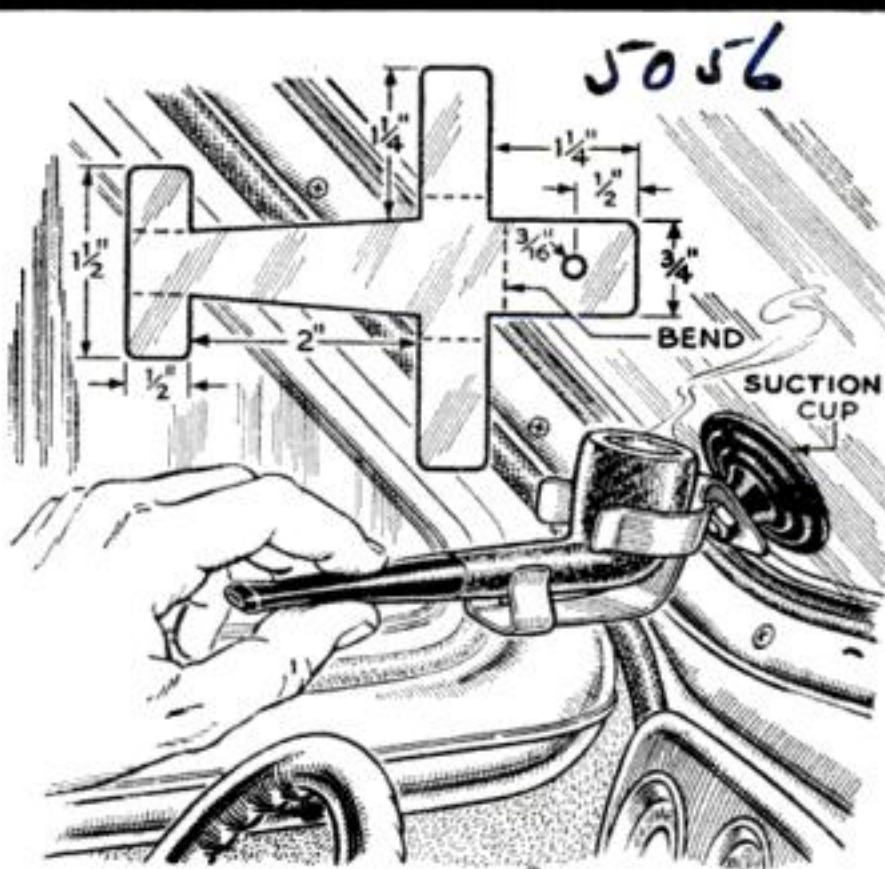
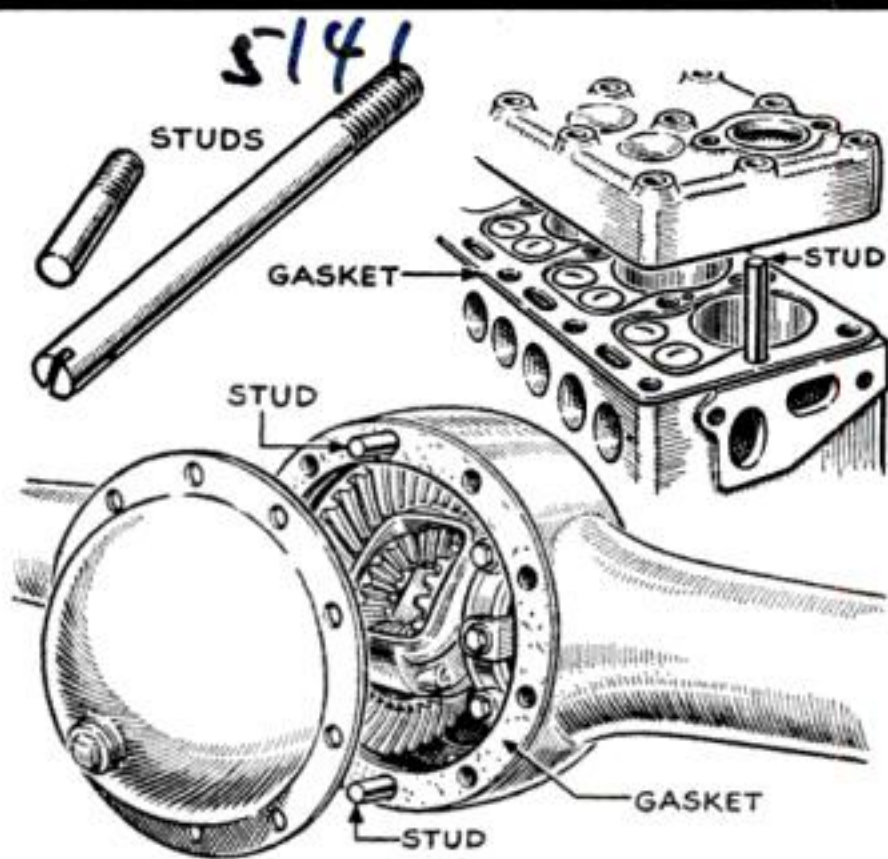




**Drain Slots Need Cleaning.** You should check over the drain slots in the door and body panels of your car occasionally. Otherwise, pent-up water may rust the metal.

For a thorough job, it's best to have the car on a hoist. However, you can locate the slots by feeling under the edges. Clean

them out (1) with a piece of wire. In some cases, you may find that the weatherstrip laps over the slot, preventing proper drainage when the door is closed. The simplest remedy for this is to cut away a slice of weatherstrip (2). Occasionally, the flange around a slot also may be crimped shut. If so, pry it open (3) with a screwdriver.



**Special Studs Align Parts.** In the garage where A. G. Patrick works in Hot Springs, Ark., you'll find a small box containing bolts of various sizes. These are not ordinary bolts, however. The head has been removed from each, and slots have been cut in some. As illustrated, these are often useful for keeping parts aligned during assembly. With several screws in, studs are removed with pliers or a screwdriver.

**Clip Supports Your Pipe.** If you smoke a pipe while driving, you can give your jaws a rest occasionally with this clip. Copper or aluminum is easiest to work, but brass is more springy and makes a better clip. Using the pipe as a guide, bend the metal to shape. A suction cup with a screw molded into it can usually be found in an auto store. The clip was designed by Arthur Trauffer, of Council Bluffs, Iowa.



# Gus Races Trouble to the Wire

At a tough, hard-fought motorcycle run, he plays a fast hunch for a winner.

*By Martin Bunn*





**"HEY!"** Stan Hicks yelled. "What's that?"

"It sounds like the Battle of the Bulge," Gus told him unexcitedly. "But it's just a ham motorcyclist who thinks he's going fast because he's making noise."

The ear splitting ceased. Through the shop door a tall young man pushed a motorcycle. He wore helmet, goggles, and a wide, rivet-studded belt.

"Ah!" Gus greeted him, with mock deference. "Zipp Temple, speed demon!"

The young man flashed a brief grin. "Mr. Dunlap told me to bring my bike to you."

Stan had been regarding Temple with disfavor tinged with envy. "This ain't a cycle shop," he growled. "Mr. Wilson don't bother with them—do you, boss?"

"Well," Gus hedged, "I haven't worked on one for a long time, and I haven't ridden once since the days—" He broke off to light his pipe.

"Huh?" Stan prompted.

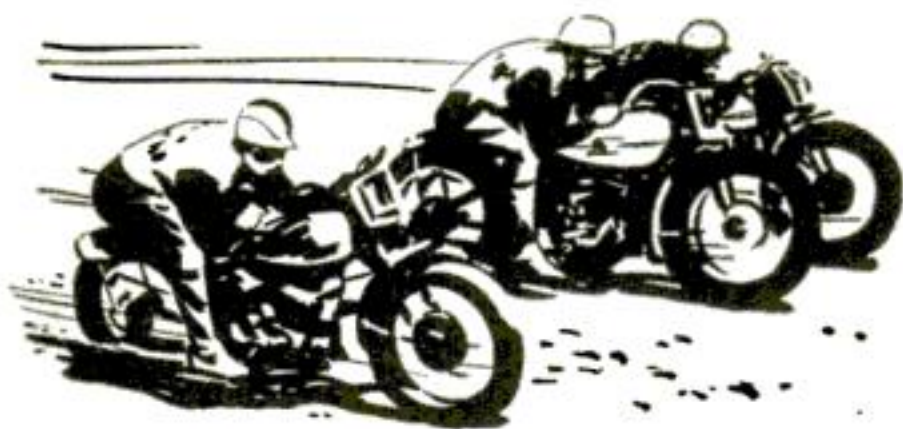
"Never mind," Gus said disappointingly.

Most of the regulars around the Model Garage know that Gus and Bill Dunlap, the perennial president of our town's Acme Motorcycle Club, used to compete when

*Gus faced the big rider. "If you pull anything," he warned grimly, "you'll have me to deal with."*







they were topflight riders back in the early Twenties. But we've never been able to learn much about Gus's riding career; he's never one to talk about himself.

"Mr. Dunlap said you'd try to speed up my bike," Zipp said importantly. "I need all the speed I can get. I'm riding for th' Acmes in th' championship Saturday."

Gus nodded. "Yes, Bill told me when he phoned." He looked the rider over appraisingly. Dunlap had also said that Zipp was a careless motorcyclist. The reason he was going to ride for the Acmes was that quiet Tom Dorsey, who'd beaten him with a lap to spare in the trials, had later injured his shoulder and wrecked his machine. "Cocky as all get out," Gus sized Zipp up.

He turned to the machine, a high-compression twin with overhead valves. A large, straight pipe had been substituted for the muffler. Gus ran a rod into the pipe and found no baffles inside it. "How long you had this thing on?" he demanded.

"Oh, a couple of weeks," Zipp told him. "A fellow at our shop welded it on for me. You can't get nowhere with a muffler on."

"There's a law against running without a muffler," Gus said, "and there ought to be. You fellows who ride motorcycles that sound like machine guns give a good game a bad name. And you're fooling yourself if you think you go any faster. You just make so much racket you think you do. Well, how's she running now?"

"Not so good," Zipp conceded. "She ain't got nearly the moxie she ought to have."

Gus grunted. "I'll take a little ride—if I remember how." He straddled the machine, strode the starter down, and rode out of the shop with confident smoothness.

Five minutes later he rode in again and swung off. "Feels like a compression leak," he said. "It might be bad rings or even a broken piston. More likely it's valve trouble."

"I'm broke right now," Zipp said.

"The club's taking care of the job for you," Gus told him with a grin.

"Okay," Zipp said, and swaggered out.

As Gus removed the plug from the front cylinder, Stan brought him the compression gauge. "Stand on the kick-starter," Gus directed when the gauge was fitted to the plug hole. He watched the indicator hand swing to the 15-lb. mark and stop. The rear cylinder gave the same result.

"Compression leak in both cylinders." He poured a spoonful of heavy oil into each cylinder, directed Stan to kick the engine over a few times, and tested again. The pointer stayed low. "It's not the rings."

"How do you know?" Stan asked.

"Heavy oil would temporarily seal off leakage past the rings," Gus explained. "If the rings were bad, we'd have gotten a much higher reading with the oil. Let's have a look at those valves."

They set to work taking the engine down. Removing the first exhaust valve, Gus held it up for Stan to see. "Warped. I expected it when I saw that nitwit had taken off his muffler."

"Wait a minute," Stan pleaded. "What's a muffler got to do with valves warping?"

Gus pointed an accusing finger at the flaring tailpipe. "An exhaust as big as that, without any baffles in it, sometimes causes an intermittent vacuum around the exhaust ports that blocks heat transfer from the valves. At high speeds they are more likely to burn."

He tossed the valve into a junk box. "No sense in wasting time with them. Run down to the motorcycle shop and get a new muffler and a set of valves. Then we'll tune her up as well as we can. If Zipp doesn't win, it'll be his own fault."

**S**ATURDAY afternoon found Gus out at the Fair Grounds. To his experienced eye the Club's two-mile course offered a wide variety of potential grief. The first few hundred yards were on the half-mile dirt track. Then there was a sharp turn and dizzy dive into a dry stream treacherous with sand and rocks. The trail clawed steeply up the bank, into another abrupt turn and a series of roller-coaster hills, followed by a long stretch deep with loose sand. Twenty-five times around would be a real test of men and machines.

As Gus came back by the grandstand a barrel-chested rider drove off. "That's Juke Crutchly," somebody said. "A tough cookie—he'll show these boys some tricks!"

Crutchly, warming his engine, was riding slowly a little out from the rail. Zipp Temple



whizzed up behind him and couldn't resist showing off. He shot through the narrow hole, brushing Crutchly's shoulder. "Fool kid—asking for trouble!" Gus thought.

Crutchly took off after Zipp, following him closely around the course. The next time they passed they were riding side by side. Crutchly shouted something at Zipp. As they went into the turn Juke hunched his shoulder, and Zipp crashed the fence.

When Gus got there a small crowd had gathered around Zipp. He was on his feet but his face was chalky. Bill Dunlap rode up with Doc Marvin in his sidecar. After a swift examination Doc motioned Dunlap and Gus aside. "The kid isn't hurt, but he's lost his nerve. He shouldn't race—and he won't do you any good if he does."

"There goes the championship!" Dunlap growled.

Tom Dorsey, who'd won the trials, stepped out of the crowd swinging his left arm experimentally. "My shoulder's okay now," he said quietly, "but my bike's got a bent frame. If Zipp will lend me his, I'd like to ride for us."

Gus was checking Zipp's cycle. It hadn't been damaged. Dunlap went over to Zipp, who was lighting a cigarette with excessive nonchalance. "All right, you ride," Dunlap told Dorsey after a nod from Zipp.

Crutchly, smiling unpleasantly, had been watching the scene. He wheeled over to Gus. "Tell this kid to keep clear of me, pop," he advised. "You saw what happened to your boy friend. I might give this one a bigger dose of the same!"

Gus looked at him, his face granite. "I was racing when you were floating chips down the gutter," he said grimly. "If you pull anything, you'll have me to deal with."

**T**HE shadow of the grandstand lay black on the track. Motors crescendoed to a roar as the half dozen riders remaining in the race slewed onto the track, with Crutchly in front. Fifty yards behind the pack came Dorsey, well satisfied to be there. With only a lap to go, he had almost a full-lap lead.

"He'll hold what he has!" Gus thought.

And then, just as Tom was slowing for the turn, his engine stopped dead!

Acme rooters groaned. Gus ran. His wind was gone long before he got to where Dorsey was working frantically over his engine. "Wha-what is it?" he gasped.

"Must be ignition," Tom told him. "She quit cold. Got plenty of gas."

There was no time for careful troubleshooting. Already the pack was out of the dry creek and highballing over the rolling hills. Gus swiftly examined the high-tension wiring—no loose connections, no broken wires. He snapped off the distributor cap, quickly checked the rotor and its contact, and ran a practiced eye over the points, breaker arm, and spring. On a hunch, and dishearteningly aware what a long shot it was, he hooked a finger under the little wire leading to the points. "Got it," he yelled.

On the underside of the pigtail loop a tiny spot of bare copper gleamed where the insulation had worn through, shorting the low-voltage ignition circuit.

Tom's quick fingers brought a roll of tape from the toolbox. Gus speedily wrapped the wire, and replaced the rotor and cap.

As Tom kicked the motor over, Crutchly flashed past, with the other riders a few lengths behind. Gus, running back toward the finish line, saw that Tom was fifty yards behind the tail-ender. But he was going!

Tom bumped down the steep grade to the river bed. Sand clawed at his wheels as he dodged the rocks. The rider just ahead of him went down in a spray of dirt; on the steep path up out of the gulley he passed another one. Now they were all racing over the succession of hills and dips; on the crests their machines left the ground and came down with bone-racking jars.

Foot by hard-won foot Tom crept up. He passed two more riders. When they went into the deep sand turn onto the track his front wheel was lapped on the leader's rear one; when they thundered out of the dust cloud they were even. As they straightened out he was on the rail and Crutchly was six feet out from it.

But Crutchly wasn't beaten. Down the stretch, their engines deafening, he again drove into the lead. A foot. Two feet!

Now Tom Dorsey used the little throttle he'd kept in reserve. He twisted the hand grip full open. Crutchly started to edge over toward the rail. Yelling he didn't know what, Gus watched the gap narrow.

And it narrowed more sharply still! Dorsey edged deliberately toward the bigger rider, taking the bluff away from him. For a split second Crutchly hesitated to take the dare. That was enough. Hugging the rail, Tom drove his front wheel even with his rival's, then inches ahead.

The checkered flag flashed down as he roared over the finish line.



5193

# New Soft Tires Absorb the Bumps

Here's what to think about if you're planning to put them on your old car.

By R. P. Stevenson

IF YOU remember putting 60 lb. of air into the tires of an old Model T, it may seem surprising that a pressure of 24 lb. can support a modern car. But it does in the new soft tires. The result is the smoothest ride you've ever had.

First announced less than two years ago, low-pressure tires are now original equipment on many new cars. At present, they're a luxury, but growing production should scale down the price.

It should be noted that these are not the oversize tires sometimes used in the past for better cushioning. Such tires were just a larger size of the ordinary type. They were never fully satisfactory because of such disadvantages as hard steering, irregular wear, and excessive unsprung weight.

The new tires were designed and engineered specifically for a greater volume of

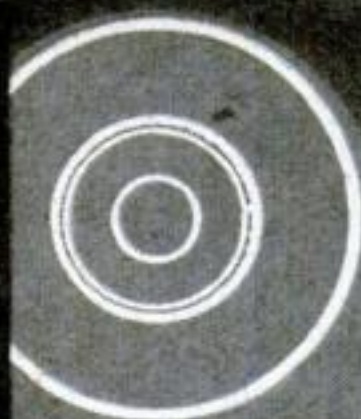
air at lower pressure. In cross section, they are wider and a little higher than the corresponding old sizes they replace. From the side, they look much the same.

In addition to a softer, smoother ride, advantages claimed for them include better traction, greater safety, more positive steering, cooler running, less road noise, and—surprisingly enough—slightly better mileage. How they envelop a road obstruction is illustrated in exaggerated form below.

You can use the new tires on an old car, but here's a warning: You'll get some, but possibly not all their advantages. Some tire engineers contend you'll get full benefit only by mounting them on wider rims. Present rims may pull in the designed width of the tire, reducing the air volume and consequently the cushioning effect.

On older cars, the cost of installing new wheels would be considerable, leaving little alternative to using your present rims.

ORDINARY  
TIRE



AXLE  
LINE



ROAD OBSTRUCTION

IMPACT SHOCK TRANSMITTED TO CAR

LOW-PRESSURE  
TIRE



AXLE  
LINE



ROAD OBSTRUCTION

IMPACT SHOCK ABSORBED BY TIRE



Before planking down the cash, however, make certain the tires have adequate clearance. In extreme cases, you may find that rear ones rub against the metal of the wheel-house. Clearance also may be so slight that you can't use chains. The front tires may touch the fender or frame on short turns. It's also worth checking whether your present spare-tire carrier will accommodate the greater bulk.

If you wish, you can start with just two of the tires. But install both of them either at the front or at the rear, not one in front and one at the rear. The best choice appears to be to mount them at the front. Car stability is apt to be reduced if they're put on the rear only.

A change to the new tires will have a few adverse effects. Acceleration will be slower because the larger tires increase the circumference of each wheel. (Incidentally, this may throw off the speedometer.) Since the tire is softer, its footprint is longer. This greater area in contact with the road improves traction, but you'll have to exert more steering effort while parking. In at least one case, the footprint area has been kept down by making the tread narrower.

The old admonition to keep your tires properly inflated has never been more im-

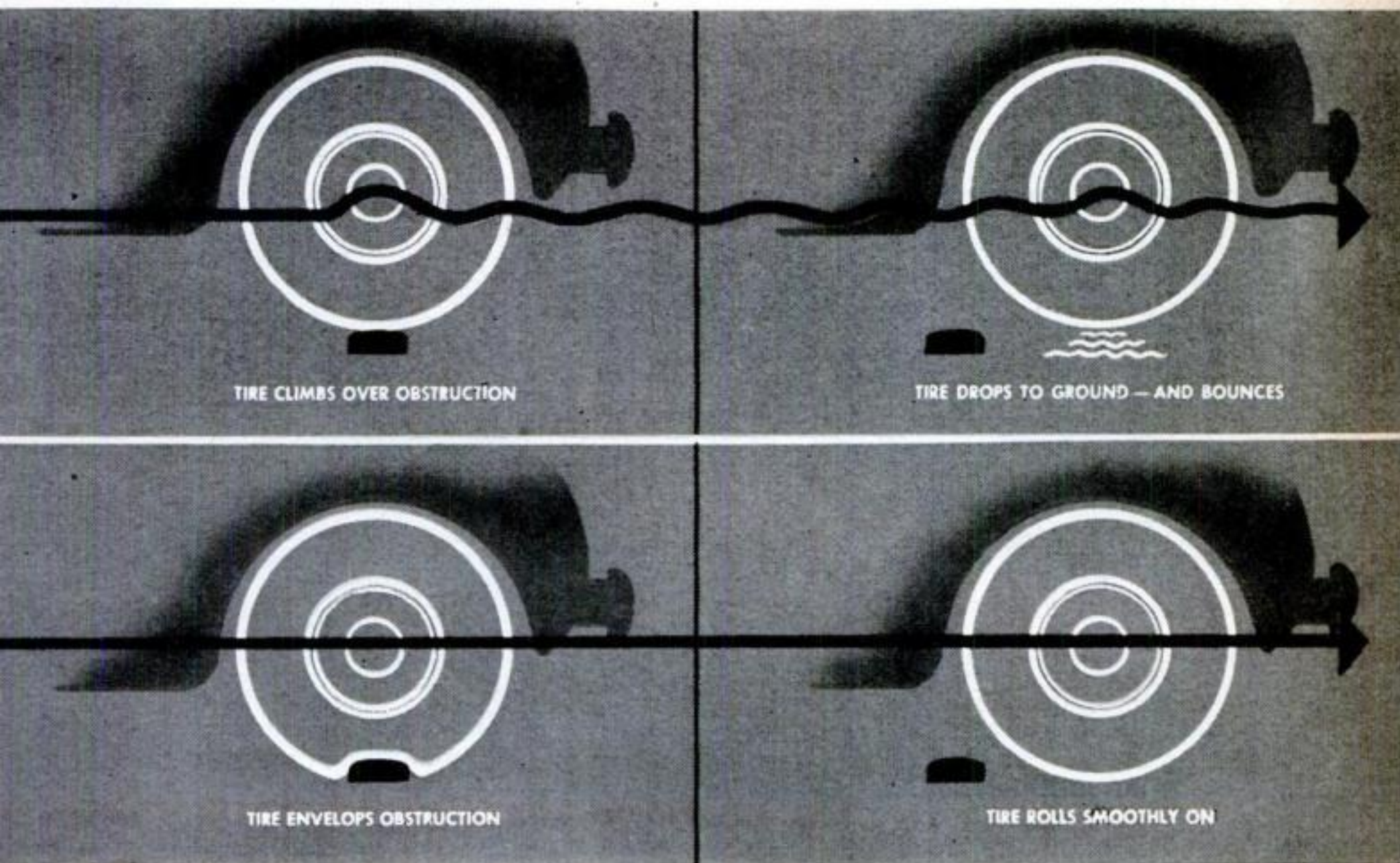
portant. Since the recommended pressure for the new tires is lower, two or three pounds difference amounts to a greater percentage than at conventional pressures.

When the tires are used as replacements, pressure recommendations may vary either way from 24 lb., depending on the make, model, and year of the car—and of course the size of the tire. Therefore, in buying a replacement set, be sure the dealer has authorized pressure recommendations to suit your case.

One large tire manufacturer is now cautioning service-station operators to be on the lookout for the new tires and not overinflate them unwittingly. Until this campaign has had time to take effect, you'll have to shoulder the responsibility of seeing that someone doesn't run wild with an air hose.

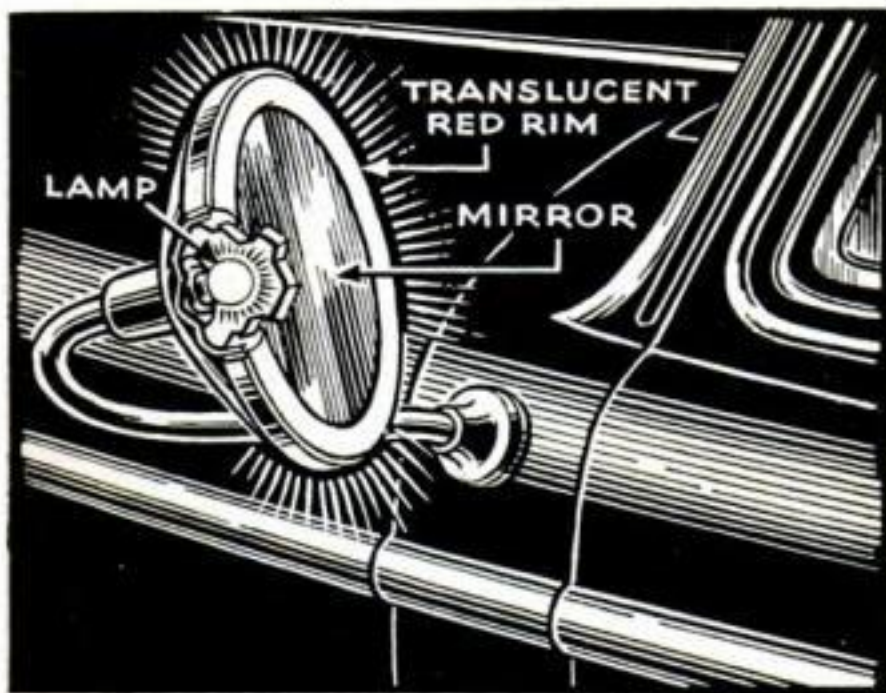
Size designations adopted for the new tires show the true cross-section measurement—the distance from side to side when the tire's inflated. For instance, 7.60 means exactly that—7.60". On the other hand, the corresponding tire that it replaces, a 6.50, actually measures 6.80". The latter discrepancy is found throughout the old size range. In general, the new tires take standard light-weight tubes one size larger than the tires they replace.

END





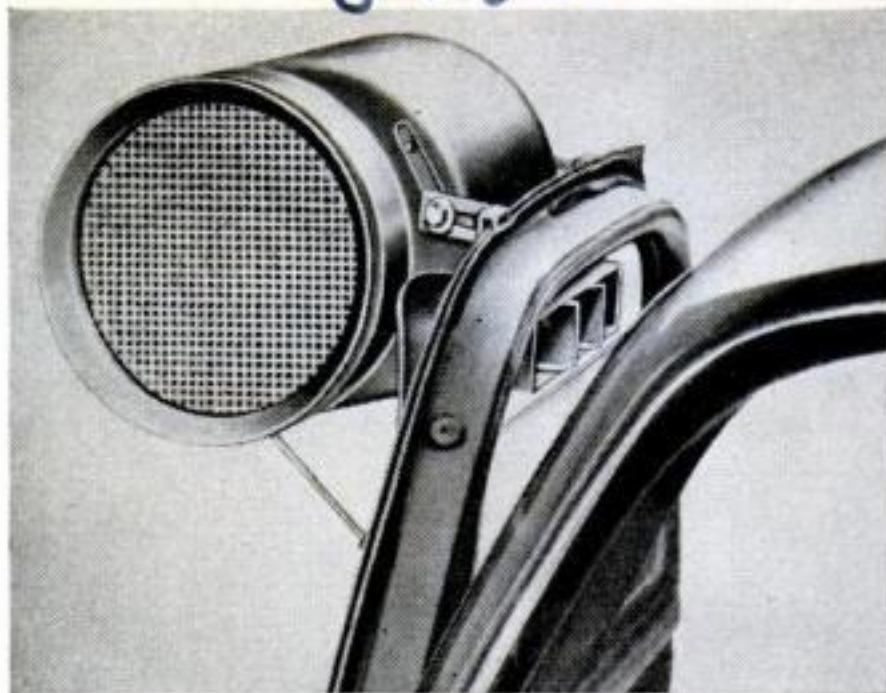
4485



### Red Light Encircles Mirror

INSTALLED on the side of your car, this new rear-view mirror serves also as a parking and rear warning light. The mirror is mounted in a circle of red plastic. When a bulb inside is switched on, the plastic rim becomes visible to drivers approaching from behind. It's offered by Jay Distributing Co., Detroit, and sells for about \$7.

5060



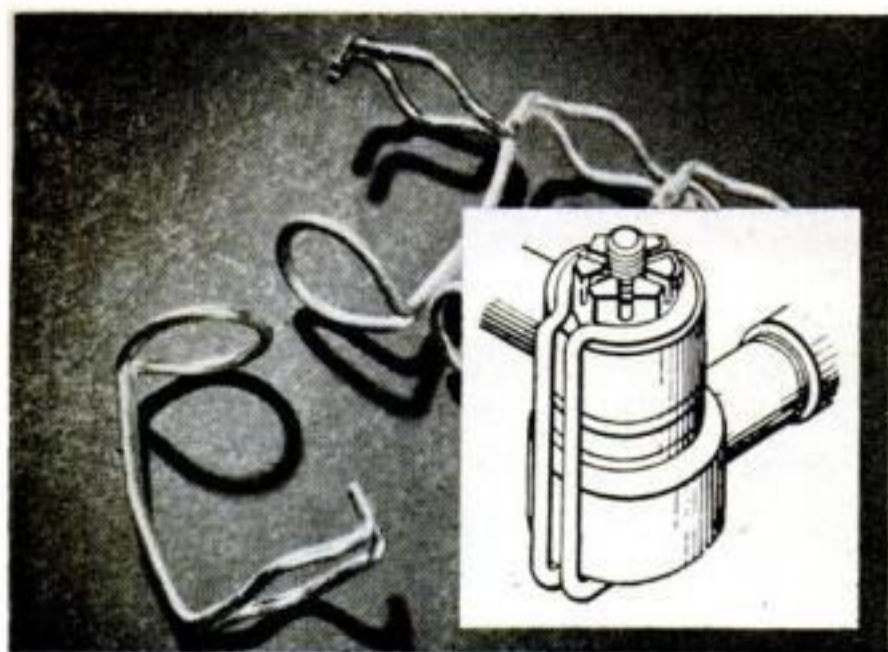
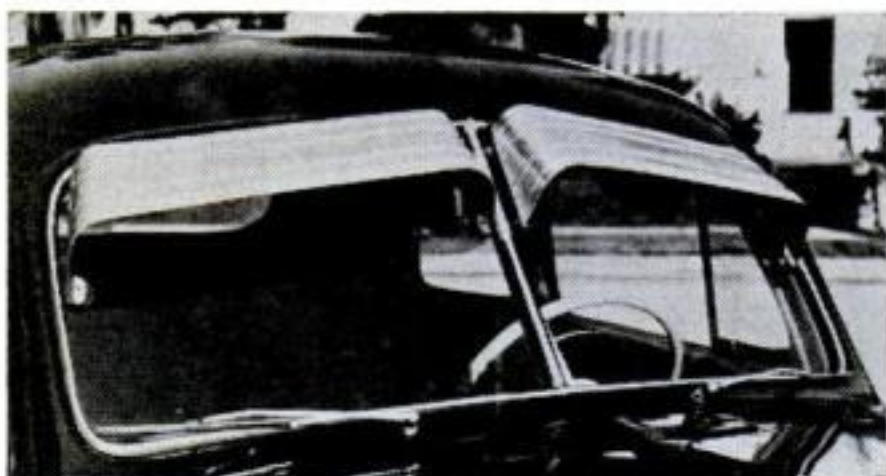
### Cooler Improves Your Ride

CAR coolers that work by evaporation have been popular for some time in the Southwest for desert driving. This one is a new design announced by Star Distributing & Manufacturing Co., Los Angeles. A different type of filter pad, treated with a chemical inhibitor, is said to assure clean fresh air at all times.

5042

### Suction Cups Support Visors

MADE of aluminum, these visors may be installed in about ten minutes. You mount them directly on the windshield with rubber suction cups, cement being applied to the edges of the cups. The visors are ribbed for strength and coated green underneath. Priced at about \$8, they are distributed by the Keene Jackson Co., Glendale, Calif.



### Clamp Protects Tie Rod

THESE steel wire clamps, designed to increase the safety factor of a steering gear, keep a tie rod or drag link from dropping off even if the ball-and-socket joint is dangerously worn. Priced at \$1.50 a set, they are made by J. S. Snider, Clarksdale, Miss.

5132



### Creeper Has Adjustable Rest

EVEN when you're at work under a car, you can easily adjust the cushioned head lift of this creeper to any of four positions. The cushion has an oilproof plastic cover. Priced at about \$10, it's made by the Moto Parts Company, of Inglewood, Calif.

5106



# Mechanics and Handicraft

REG. U. S. PAT. OFF.

*Auto Radio Goes on Picnics*

PAGE 194

*Want to Try Glass Modeling?*

PAGE 160

*Bicycle Boat for Two*


PAGE 164

*Shoot Late for Good Photos*

PAGE 188

*Take the Heat off Your House*

PAGE 204



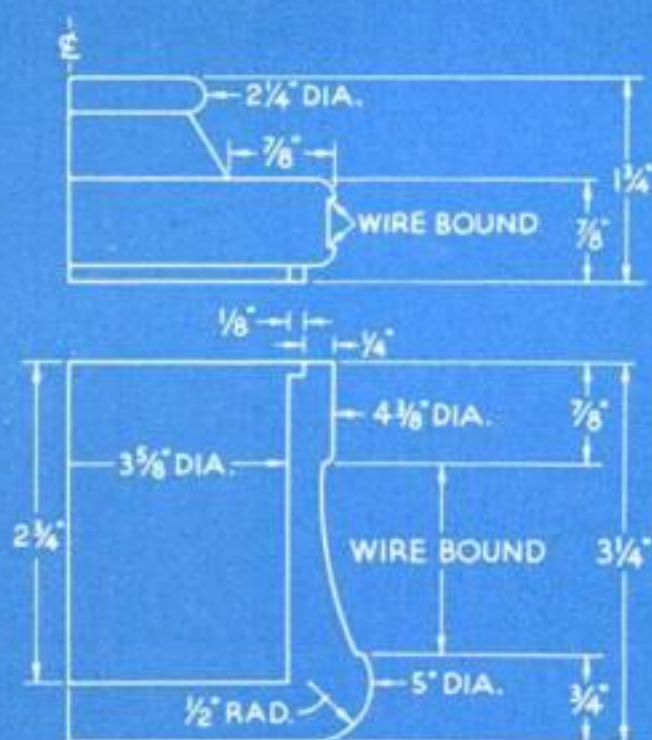
Music for driving, music for  
picnicking. This auto radio lifts  
out, behaves like a portable.

Page 194.

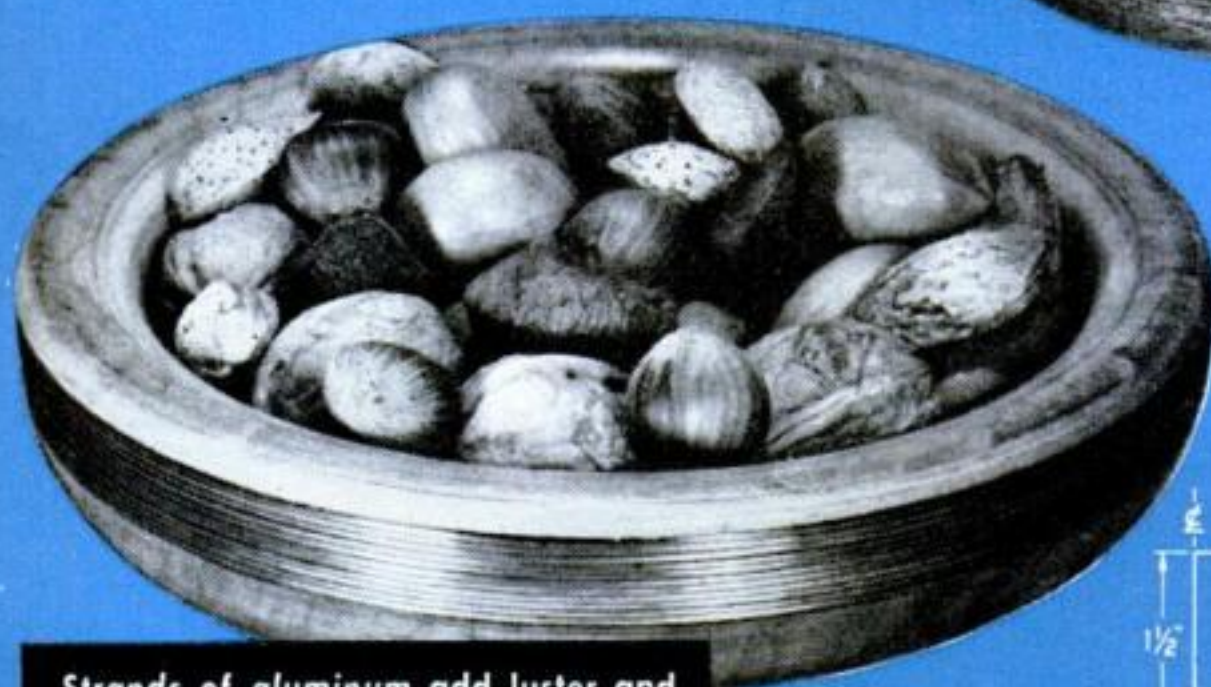
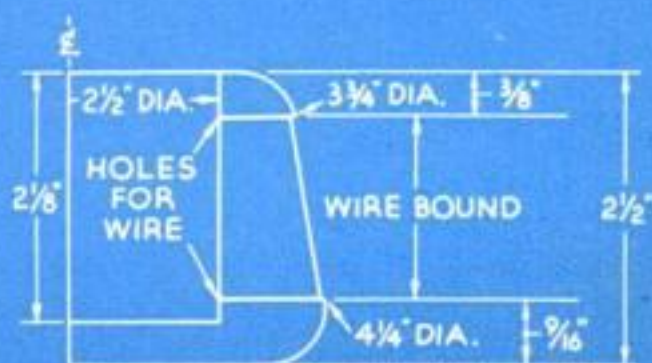




Fine copper wire was bound around this gumwood cigarette container.



Twisted wire contrasts with dark wood in a plant holder.



Strands of aluminum add luster and extra richness to this simple nut dish.





# Wire Enriches Lathe Projects

5/15

**Aluminum, copper, or brass bindings add color, contrast, and sparkle to three fine wood turnings.**

**M**ETAL can add luster and sparkle to the dull gleam of fine wood. As instances, these three lathe projects are strikingly enhanced by simple wire windings.

Since wire is obtainable in a variety of metals and gauges, you'll find it easy to select types which contrast pleasingly with the wood. Aluminum wire looks well with maple, copper with walnut, and brass with mahogany. On articles of contrasting woods, you can use different wires, placing each against the wood which best suits it.

Two wires twisted together will give you a nice effect, as shown in the photo of the plant holder on the opposite page. Use an electric drill, or even a hand drill, and a vise. Place two ends of the wires in the vise and the other two in the chuck. Pull until the wires are taut and start the motor. The tightness of the twist depends on how long you run the motor. Keep your face well away, for the wire may snap back if it breaks.

To make the pieces shown on the opposite page, first turn them on the lathe, recessing them at the points you will wrap with wire. Drill small holes at the start and

finish of the winding that is to be applied.

Insert an end of the wire in a hole and bend it over inside. Pull it tight and wind it on by hand while the work is in the lathe. At the end of the winding, insert the wire in the second hole and again bend it over. Small escutcheon pins may be used to hold the wire instead of holes.

Here are suggestions you may find helpful in decorating with wire:

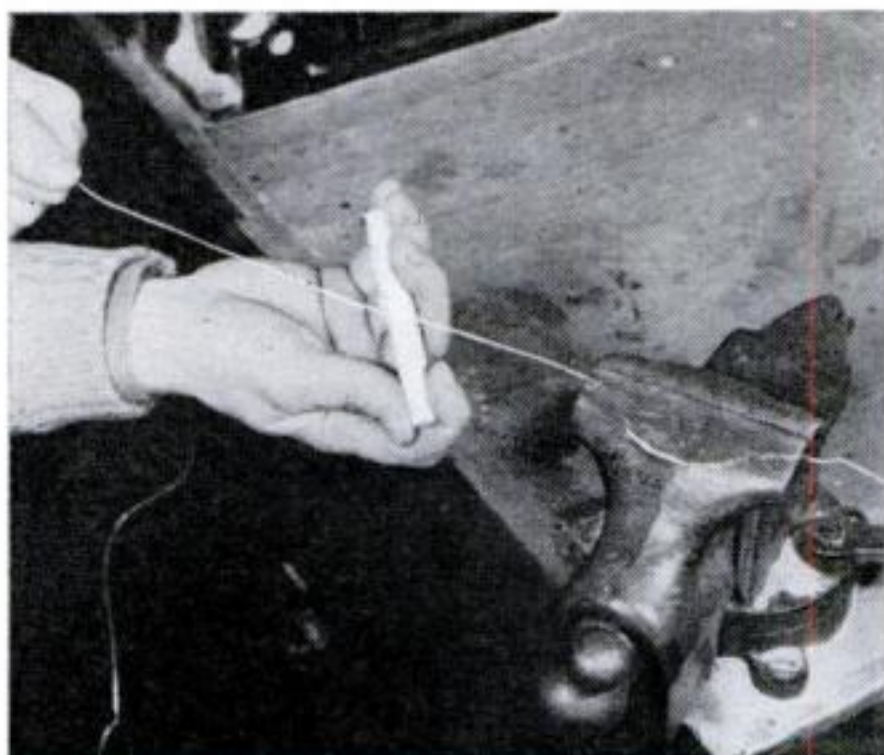
Use a wire that is easy to handle—not too heavy, and without any spring in it. The gauge should be in proportion to the size of the article.

For an impressive two-tone effect, wind with a plated wire. Buff the wire to cut through the plating after winding it on.

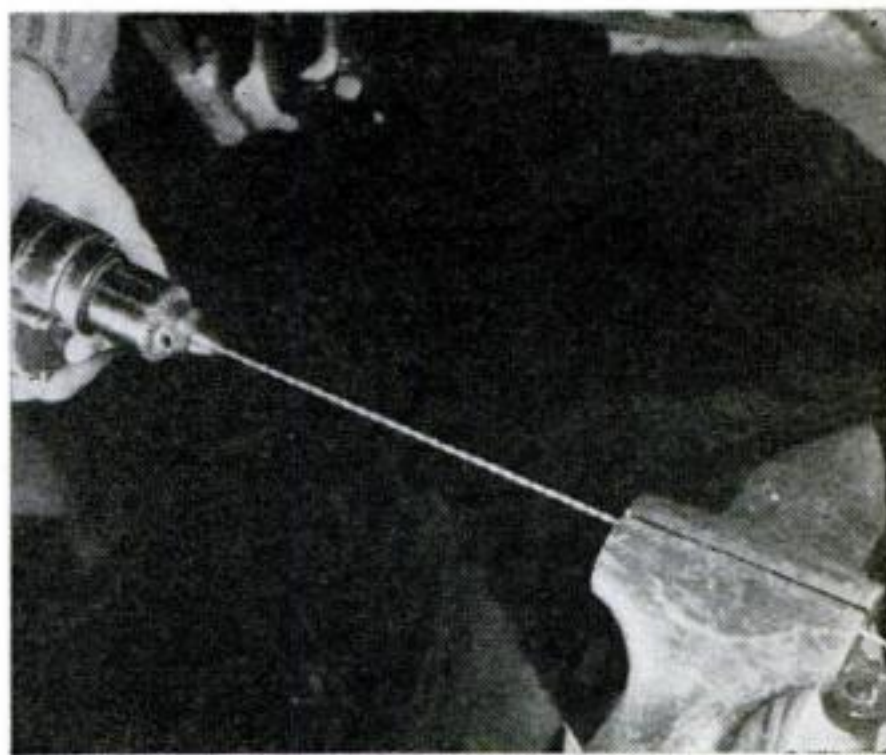
To remove kinks from wire, pass one end of it through a small hole in a hardwood dowel. Lock this end of the wire in a vise. By holding the wire taut as the dowel is pulled along it, kinks are smoothed out.

Wire may also be straightened by placing one end of the wire in a vise and the other in the chuck of a hand drill. Stretch the wire and then repeatedly snap the handle of the drill back and forth through a half turn.

Do all sanding before winding wire, to keep dust out of it. Coat wire with clear lacquer.—R. J. De Cristoforo, Bronx, N. Y.

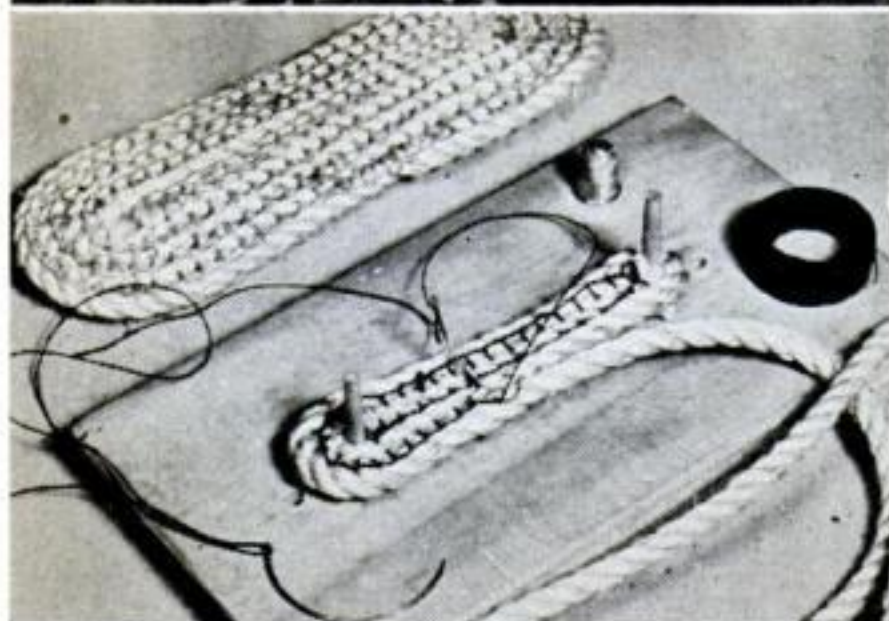


**Use a hardwood dowel, a vise, and a little elbow grease to quickly remove kinks and bends in wire.**



**Twist two wires together with a drill motor and a vise. A hand drill or even a brace will also do.**





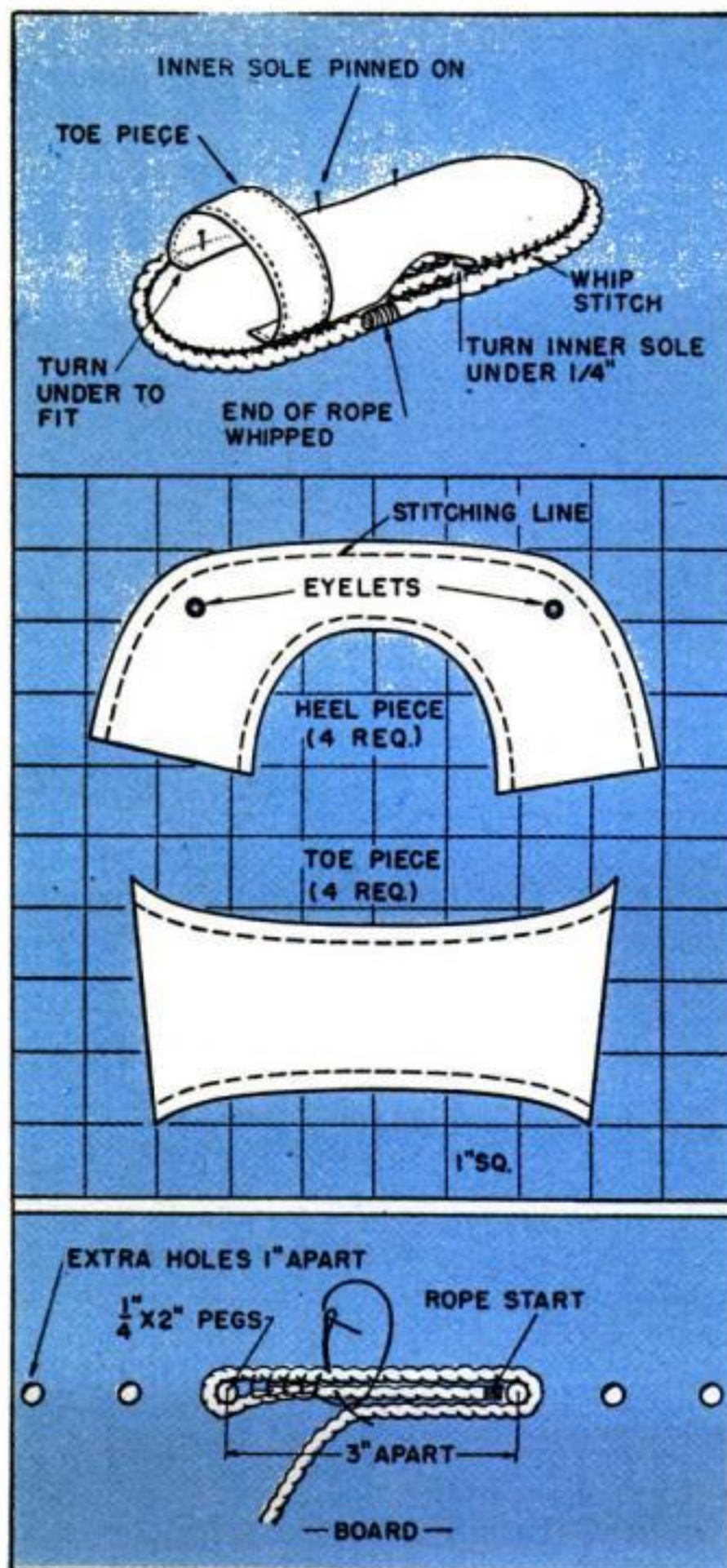
A pegged board like this is used in Spain to fashion durable sandals of rope and canvas.

## 5191 **Spanish Sandals for Beach or Boat**

**G**IVEN enough rope—about 12' of it—you can make a pair of rope-soled sandals that are fine for beach wear.

Here's what you need:  $\frac{1}{2}$ " Manila rope, strong thread, a 3" curved upholstery needle,  $\frac{1}{4}$  yd. of canvas, shoestrings, and a board drilled to take 2" pegs. The size of the sole is governed by the distance between pegs.

To start a sandal, put an end of the rope against the heel peg. Loop it around the toe peg. Then use a blanket stitch or a whip stitch to sew the rope together. Wind the rope around and around the pegs, sewing each turn fast, until the sole is the proper size. To finish, firmly whip the end of the rope inside the instep.



Cut four heel and four toe pieces. Stitch two of each kind together, leaving the ends open, to make double-thickness toe and heel pieces for each sandal. Then turn the sewed pieces inside out. That will place the rough edges inside.

Cut two canvas or cloth inner soles shaped like the rope soles but  $\frac{1}{4}$ " larger all around. For more comfort, you can add an extra layer of canvas or felt between the rope and inner soles. Lay the inner soles over the stitched side of the rope soles. Turn the  $\frac{1}{4}$ " edges under and pin them down. Then sew them down all around. Place the wearer's foot on the sandal to see where the heel and toe pieces go. Turn under at the ends for a snug fit.—Doris Aller, San Francisco.



# What's Your Ingenuity Quotient?



**Ice cream for eight** was a muscle-bending chore until I was electrified by an idea. Now I let the electric drill supply elbow grease for turning our big freezer. Unscrewing the crank, I tighten the drill chuck on the shaft. When the drill slows down, the cream is made and is left to set hard.  
—Bill Lipscomb, Shelby, N. C.



**You have to get up early** to scare birds off fruit. Not to lose sleep, I let my chickens do it. I hung cans to a string and dropped a cord from this to a board in the chicken run. Chickens, like birds, are up early for breakfast. As they step out onto the pivoted board, they clank away the marauders.—J. R. Parsons, Los Angeles.



**I can keep cool** with a breeze on my brow, but our typist can't bear "that terrible draft." She wanted zephyrs around but not on her. No matter how the oscillating fan was set, one of us was hot under the collar until I mounted it at an angle. Now its blast fans me, but goes right over her permanent.—John Rynal, Manhattan, N. Y.



**It's in the bag.** All the suitcases we could squeeze into our trunk compartment left us with waste space and unpacked duds. So I stuffed the stuff into plastic pillow covers that zip up at one end. They fitted anywhere, kept things clean and dry, were easily washed, and showed at a glance what was inside.—Polly O. Simms, Ceres, Calif.

Have you pulled off a smart one lately? We will pay for acceptable contributions showing ingenious solutions of problems in the home, shop, garage, or camp. It doesn't matter if it's wacky—if it works. Use government postcards only. Contributions cannot be acknowledged or returned.

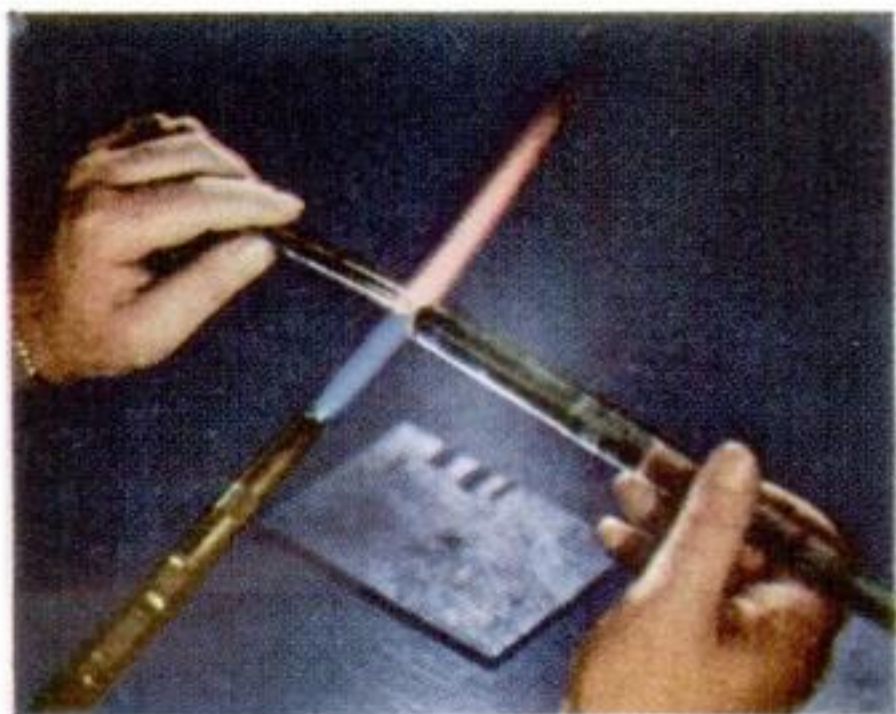




**On parade here** are some of the strange little animals that the di Renzo brothers create in their Brooklyn shop. Made of clear glass, the novelties are decorated with tinted lacquers.



**Cocktail drinkers** should take a second look at the modeled heads on these stirring rods. Viewed from some angles, the elephant head at the right is green; from others, it is pink.



**1. This is how** the giraffe at the top of the page was produced. As the first step, the ends of two Pyrex ® rods are softened in an oxygen-gas flame at a temperature of 3,500 deg. F.



**2. As the rods fuse,** steady rotation causes the softened glass to ball up. The body is now shaped from this thickened area by stretching, compressing, and bending it as required.

**5. Ears and a nose** are applied by fusing the ends of small glass rods to the head at the appropriate spots, stretching them out, and then heating and pulling away the surplus.



**6. Legs are added** in the same way—by fusing thin rods to the body. The bottoms of the feet are flattened and leveled by heating and then pressing them against an iron plate.





5276

# Flame Shapes a Glass Menagerie

**Craftsmen mold fanciful birds and beasts in a blowpipe jet. You can try it yourself with a Bunsen burner.**

**By Kenneth M. Swezey**

*PS Photos by W. W. Morris*

**I**N A LITTLE shop in Brooklyn, N. Y., the di Renzo brothers, Guy and Angelo, carry on one of the most unusual crafts in the United States. They create whimsical miniature animals, tipsy humans, merry-go-rounds, ships, angels, and devils—all from white-hot Pyrex <sup>®</sup> rods. With skilled hands

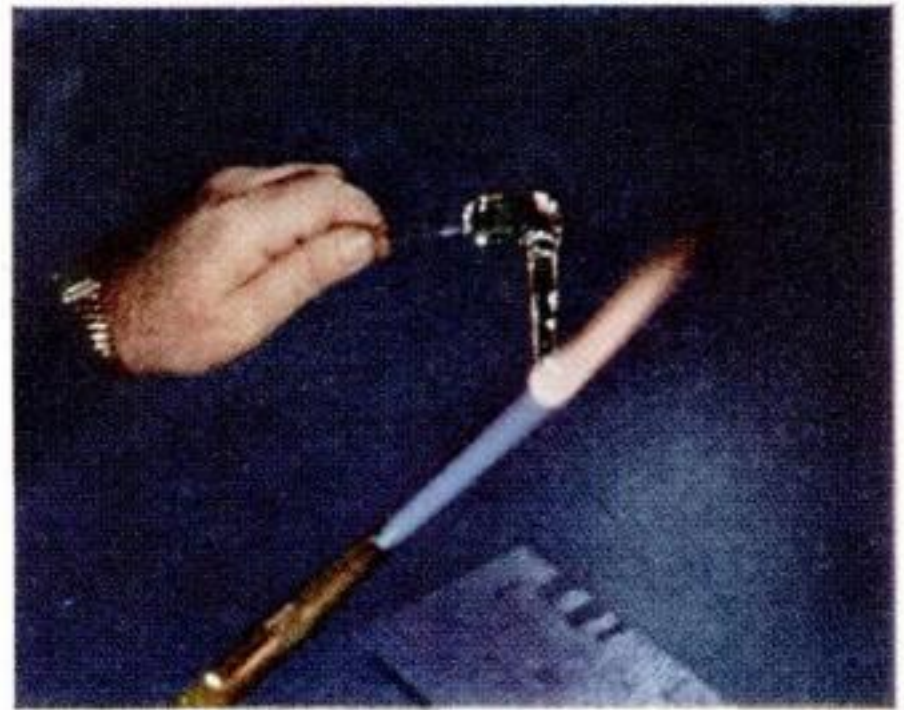
and eyes, they model this heat-softened tempered glass almost as easily as if it were clay.

Although blown glass objects have long been produced in this country, the di Renzos were among the first here to model art novelties from solid glass. Until the beginning of the recent war, such novelties came almost entirely from Germany and Czechoslovakia. When importations stopped, the di Renzos were invited to learn the art from a German refugee.

Neither had any art training. At first the going was tough. By the end of the first week's training, Angelo had managed to



**3. Next comes the neck.** This is formed from the part of the heavy rod not needed for the body. Softened, this is drawn to the desired length. The short rod serves as a handle.



**4. A head is created** by rotating the end of the neck in the hot flame. Again, the softened glass rolls up in a ball. Careful manipulation brings it to the desired shape and size.

**7. A tail comes last.** This is quickly done by heating, stretching, and pulling off the rod that has served as a handle. A pair of tweezers holds the head of the giraffe during this step.

**8. Paint completes the job.** Long experience and considerable artistic ability are needed for such projects. For some simple projects with ordinary soft glass, turn the page.





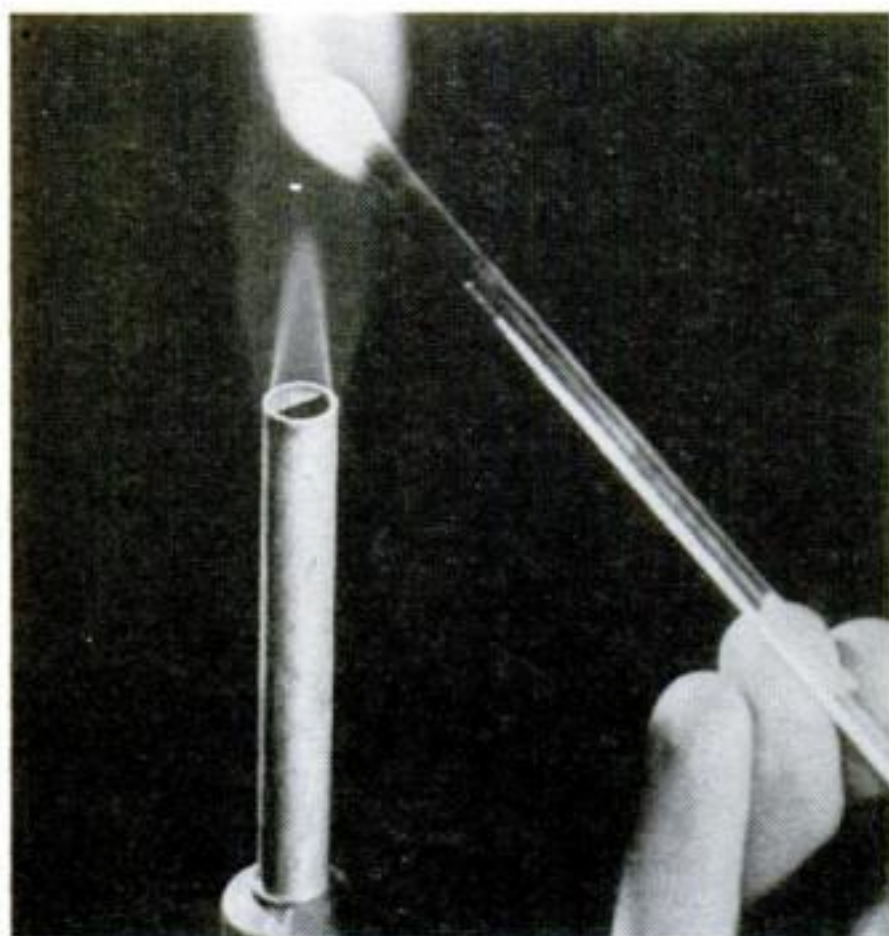
turn out just a dollar's worth of unspoiled work. The brothers learned fast, however, and during the war they helped train workers to make radio and radar tubes. The war over, they set up their own shop. Their output is now sold in shops all over the country.

The photos on the two preceding pages illustrate how they produce their novelties. Months of experience and considerable artistic ability would be required to duplicate

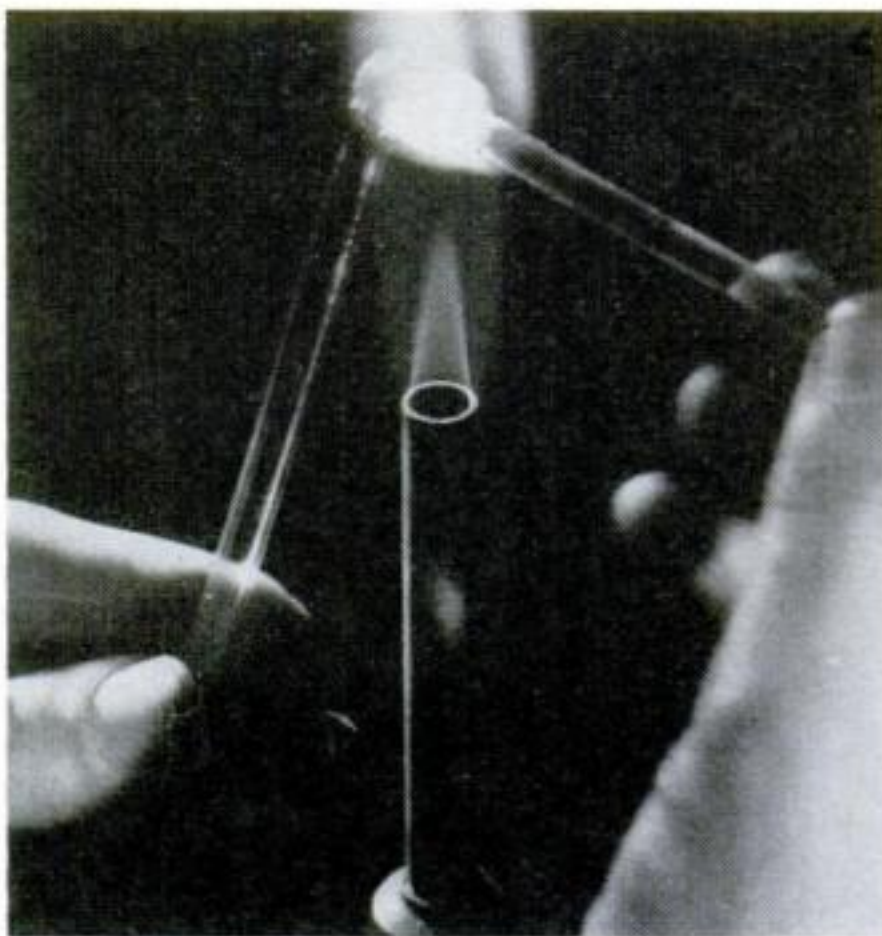
their work. Also, a temperature of 3,500 deg. F. is needed to melt Pyrex.

If you'd like to try your skill at this art, however, you can use ordinary glass stirring rods and a Bunsen burner. This glass is soft enough to melt readily in a Bunsen flame. It should not be too difficult to model simple figures on the ends of such rods. As a starter, why not try the dog's head illustrated below?

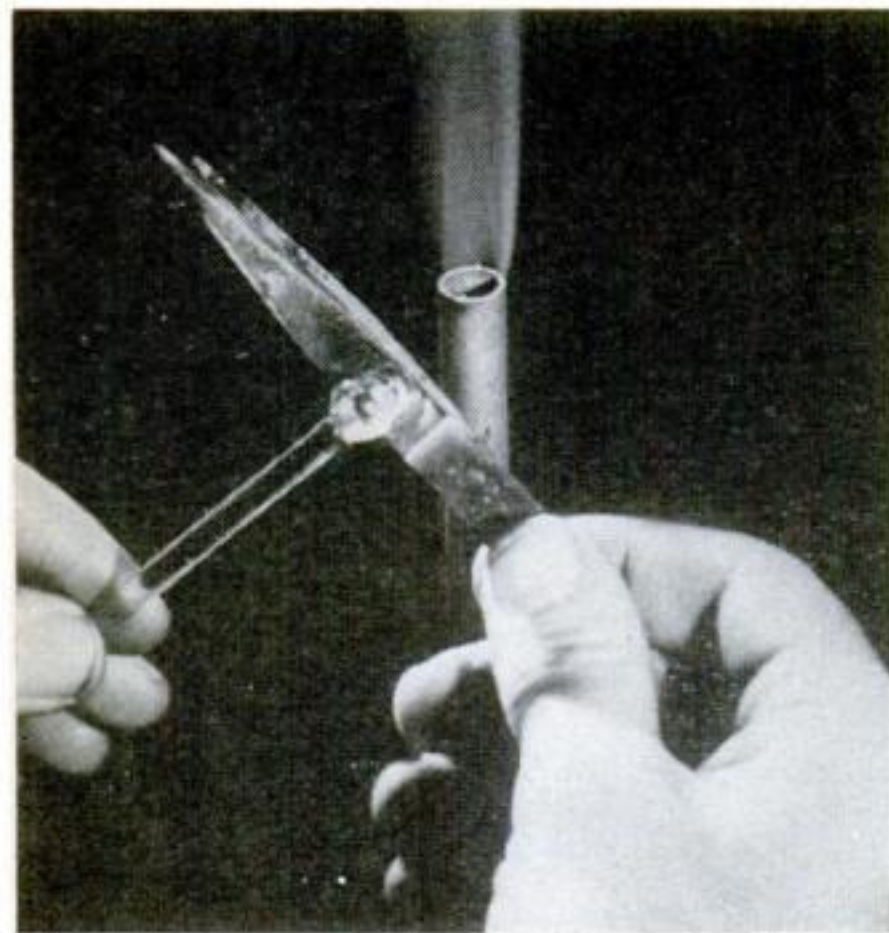
END



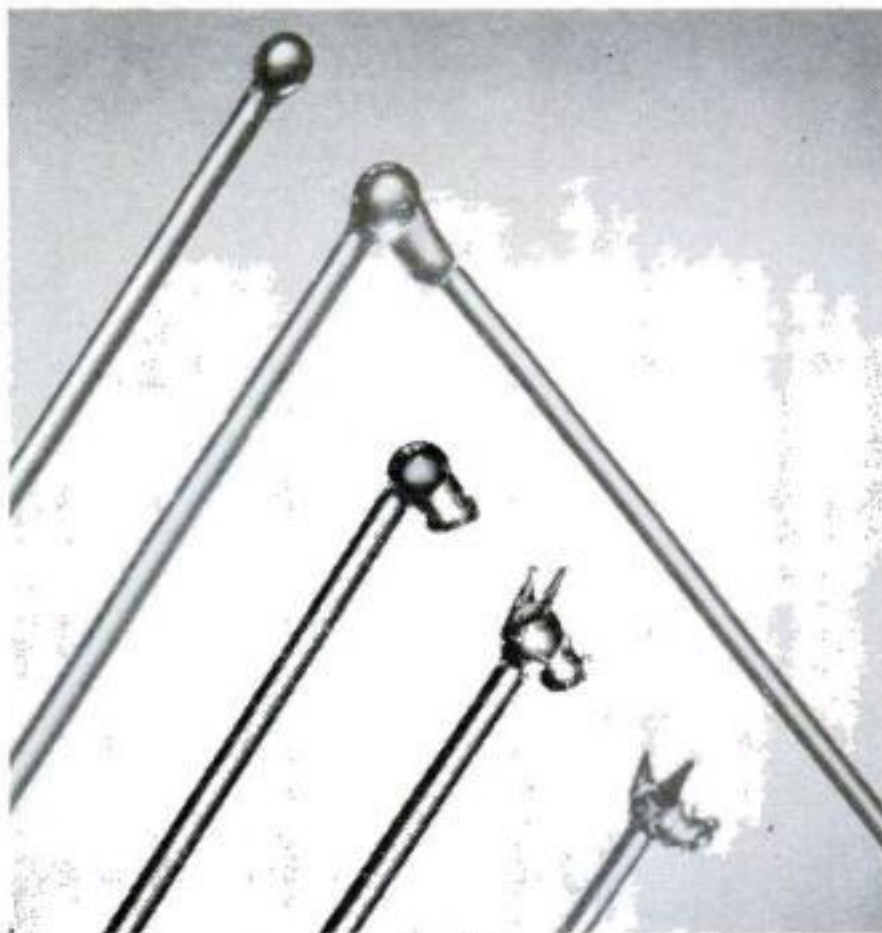
**You can make a dog's head** from ordinary soft glass rods. A Bunsen burner gives enough heat to melt this glass. Rotate two of these rods in the flame until a ball forms on each.



**Fuse the balls together** at approximately right angles. Let the left one cool, but keep heat under the other. Pull on the latter to form a nose. Heat at the proper point and pull off.



**Flatten the nose** by heating the end and pressing against a metal object (here it's a pair of tweezers). For ears, eyes, and tip of the nose fuse on small rods and draw them out.



**Successive stages** in making the dog's head are seen here from top to bottom. Paint the eyes and ears with colored lacquer. Make several and you have a novel set of stirring rods.



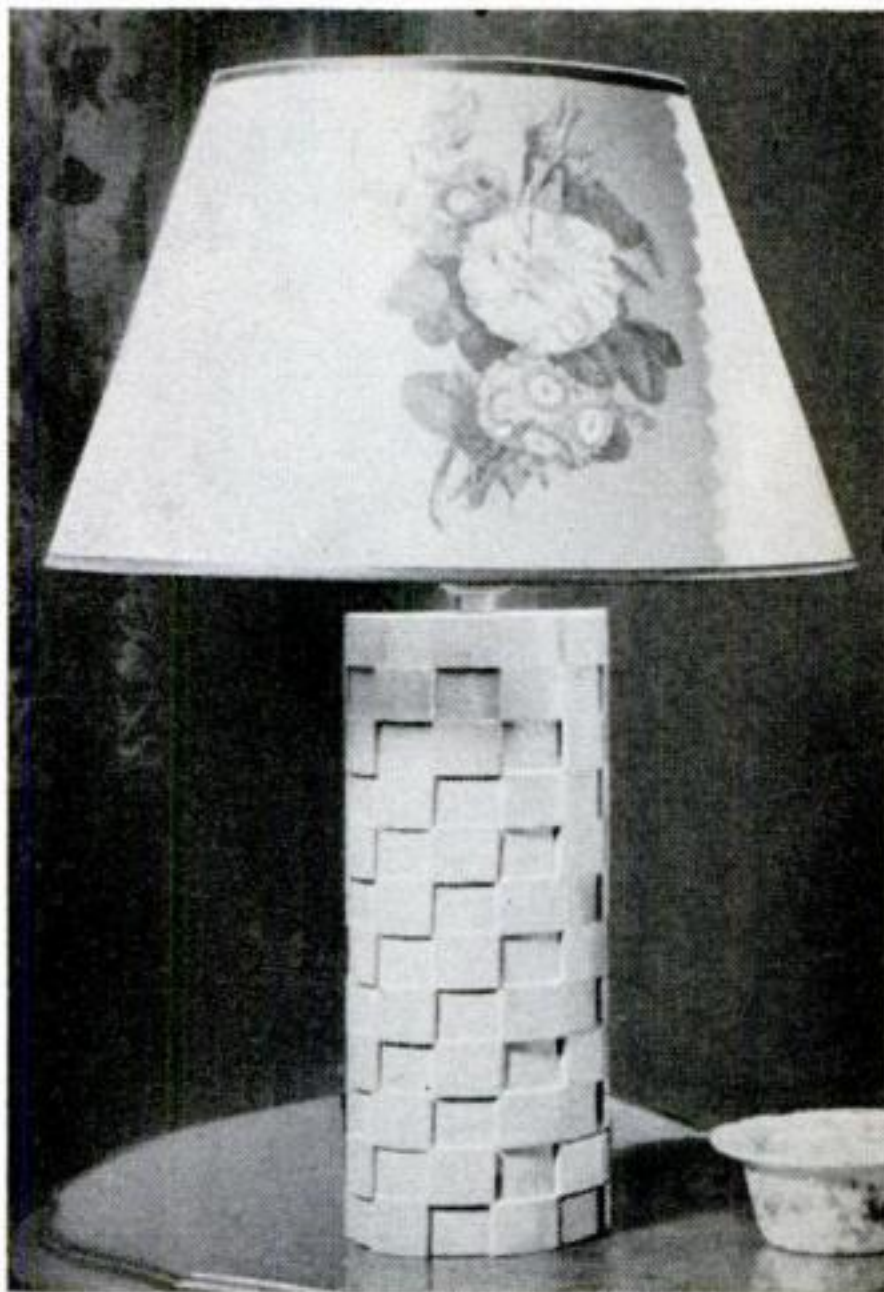
# Lamp is "Carved" on Jigsaw 5114

WHILE this lamp appears to have been carved from a single block of wood, it actually was cut from scrap stock with a jigsaw. The only materials cost was for electrical parts.

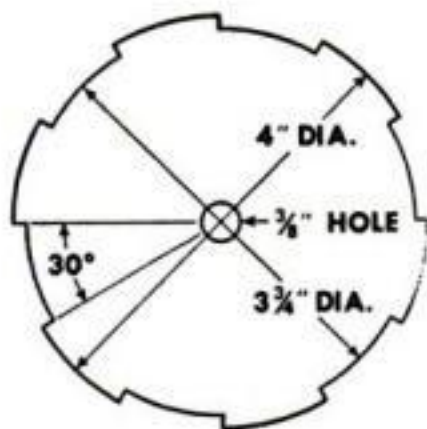
From any kind of  $\frac{3}{4}$ " wood, saw, turn, or cut with a circle cutter 12 disks 4" in diameter. Jigsaw six cutouts on the circumference of each as detailed in the drawing. Drill a  $\frac{3}{8}$ " hole in the center of each piece. Then glue the pieces together in a stack so that the cutouts of each are aligned above the projections of the disk below. To prevent rotation of the pieces in relation to one another, drive nails through the underside of each into the disk above.

Apply extra pressure while the glue is setting by slipping the assembly on a metal rod or  $\frac{1}{2}$ " pipe and tightening nuts on each end. It is a good idea to fit protecting blocks of wood between the work and the nuts.

For wiring, drill a horizontal hole in the



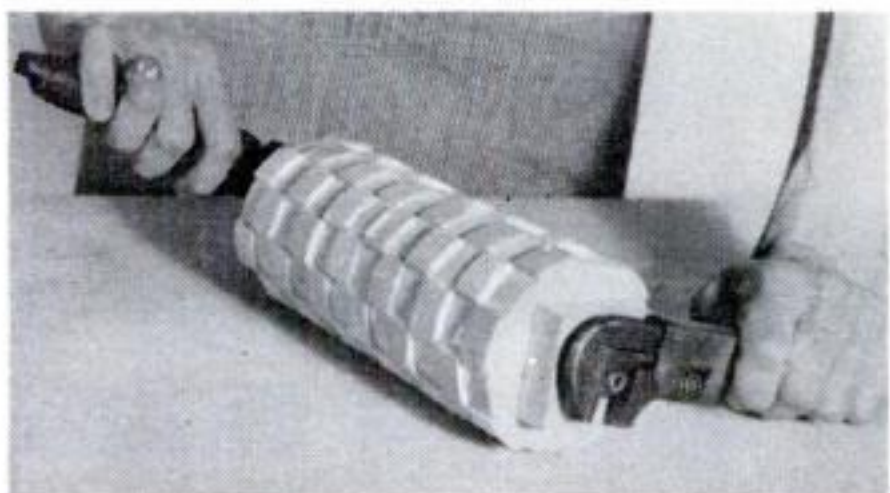
bottom disk to meet the center hole running through the disks. Press a  $\frac{1}{8}$ " pipe nipple into the hole in the top disk for a socket.—Bertram Brownold, Cedarhurst, N. Y.



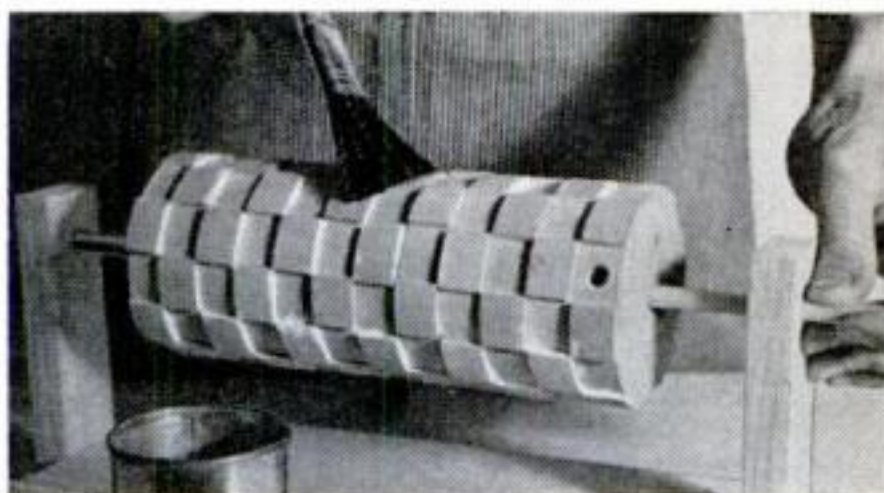
Make six cutouts in the circumference of each disk. Drill  $\frac{3}{8}$ " hole in center of each piece.



A piece of pipe will hold the pieces while glue is applied. Note nails to prevent disks rotating.



Tightening nuts on ends of the pipe will hold the pieces firmly in position while glue sets.



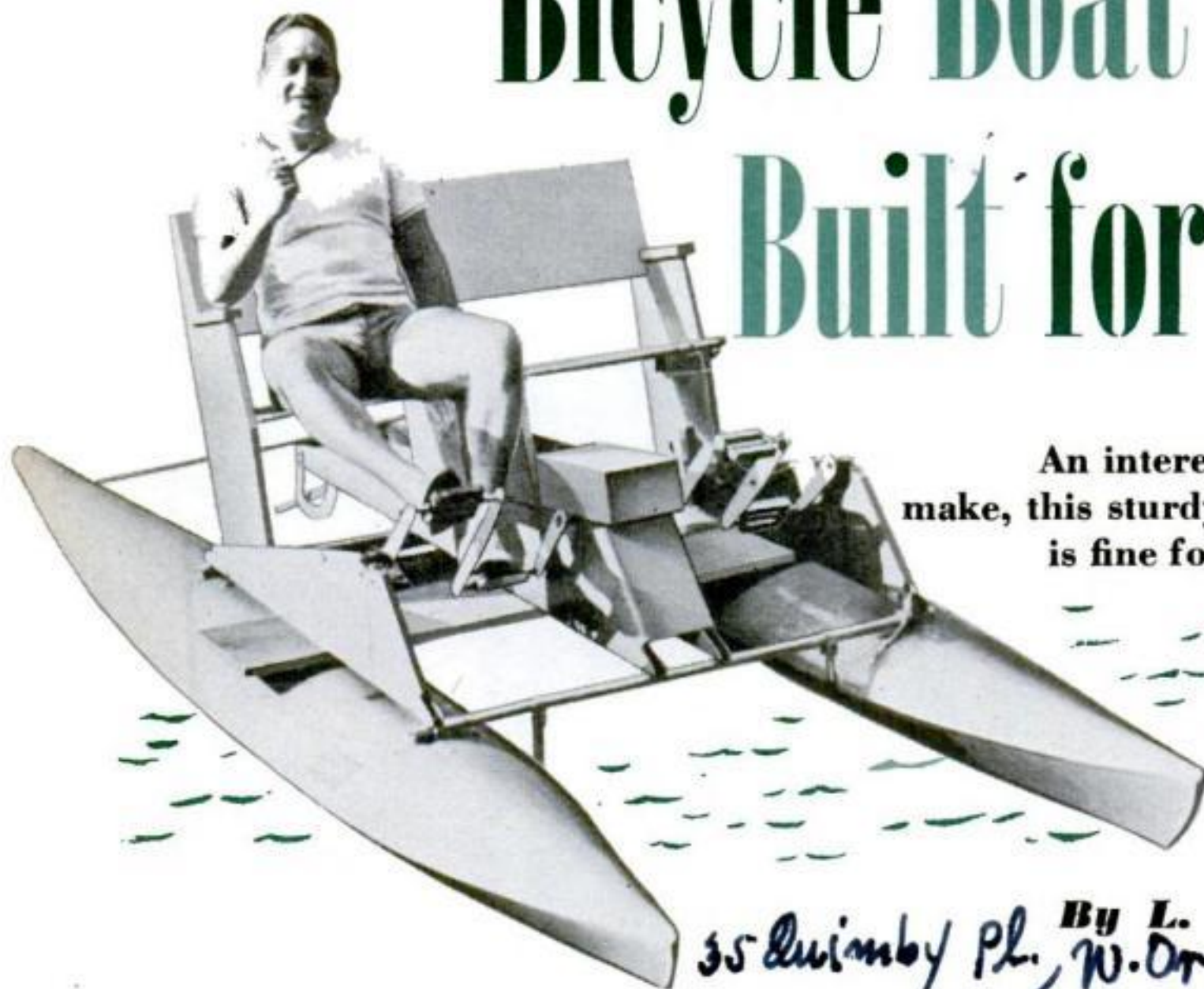
This holding jig is convenient if the lamp is to be painted. Hole at right end is for wire.



342

# Bicycle Boat

## Built for Two



An interesting project to make, this sturdy pontoon craft is fine for fun or fishing

By L. W. Schaper  
35 Quimby Pl., W. Orange, N. J.

FOR these long, lazy Summer afternoons, here's an ideal boat for loafing. You have your choice of power for it—pedals driving a paddle wheel or propeller, or an electric or outboard motor.

The pontoons, most important part of the craft, may be covered with .020" or .032" aluminum or with plywood. I used  $\frac{3}{8}$ " water-proof plywood on the one I built. Three 4' by 8' sheets are enough.

For frames, use eight 12' lengths of 1" by 1" white pine, and about 8' of 1" by 12"

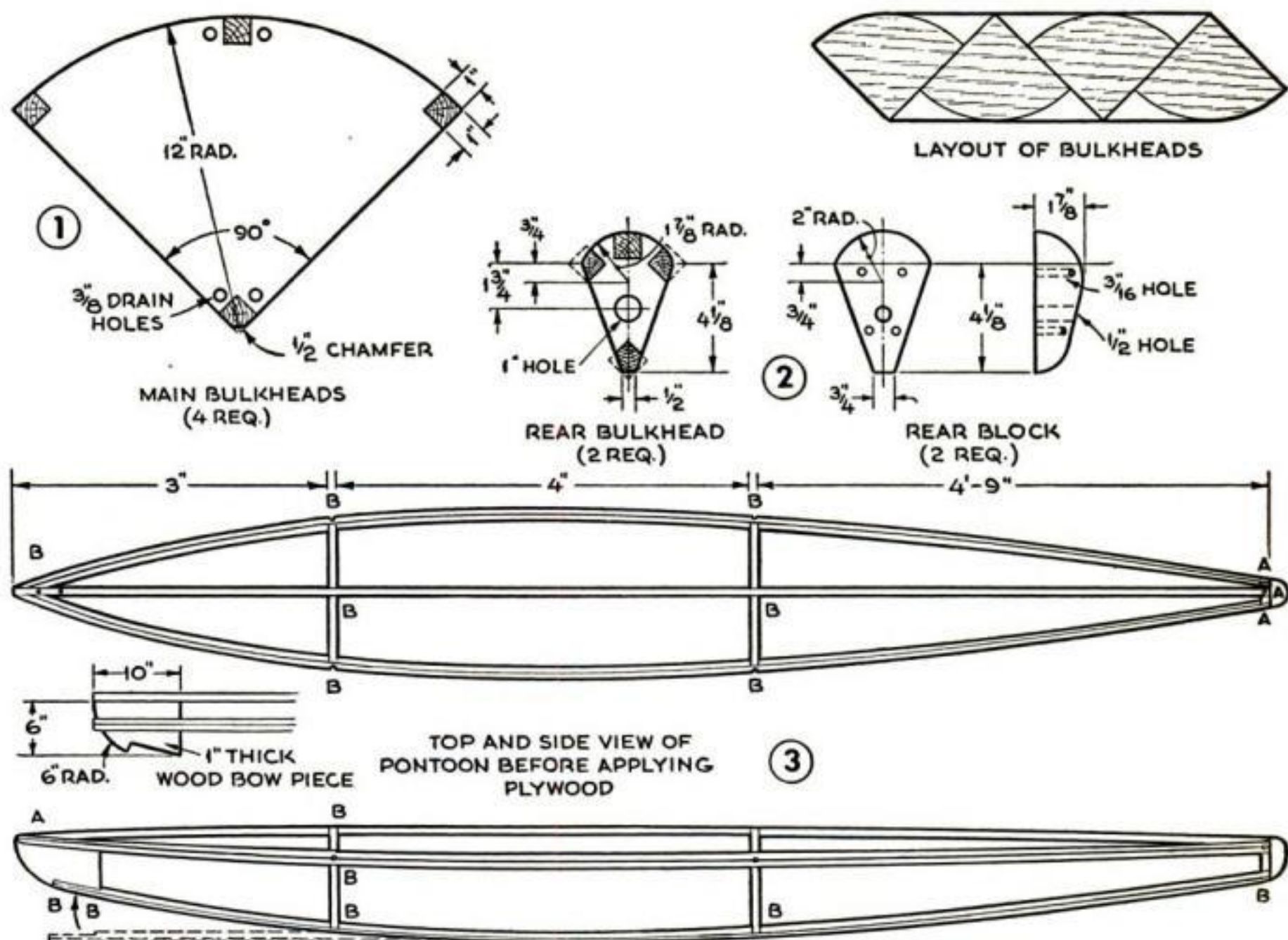
pine for bulkheads. The rear blocks are shaped from a piece of two-by-four. Figure 2 gives you the rear block and bulkhead dimensions and hole locations.

Lay out the four main bulkheads on the 1" board as indicated above Fig. 2. At this point, drill the  $\frac{3}{8}$ " holes in the bulkheads as in Fig. 1. These holes are for drainage if the pontoons should leak. By resting the boat across a dock and raising the front, the water will drain through the 1" hole in the rear bulkhead and the  $\frac{1}{2}$ " hole in the rear



Each pontoon had a rudder at time of this photo. Single rudder was installed later.





block. Taper the latter hole with a round file and use a cork as a plug. A screw in the cork will make it easier to remove.

I neglected to drill drains in my boat. Later, I had to cut ports in the top of each pontoon section and siphon out the water.

Your next step is to drill screw holes through the 1" by 1" frames where they join the bulkheads and bow piece. Countersink all screws. The screw heads must be well sunk in the side and bottom frames at the bow and stern. At these points the frame

pieces are planed down to a flat surface for the plywood covering.

Cut the bow piece as in Fig. 3 and trim the bottom frame to fit it. Trim the side frame pieces to fit flatly against the bow piece. If you think the three frame members at the bow won't go into place without cracking, steam or soak them in hot water until they are more pliable. Hold the side frames against the bow piece and mark the parts to be planed off to make them lie flat.

In assembling the pontoon frames, use the right screws—1 1/4" No. 10 flatheads at A and 2 1/4" No. 10 flatheads at B, Fig. 3.

The plywood is put on the frame of each pontoon in nine pieces—three on the top and three on each side. Cut the plywood so the bow and stern sections join the center section at the middle of the 1" thick main bulkheads. This leaves a 1/2" edge of plywood on each section for screws.

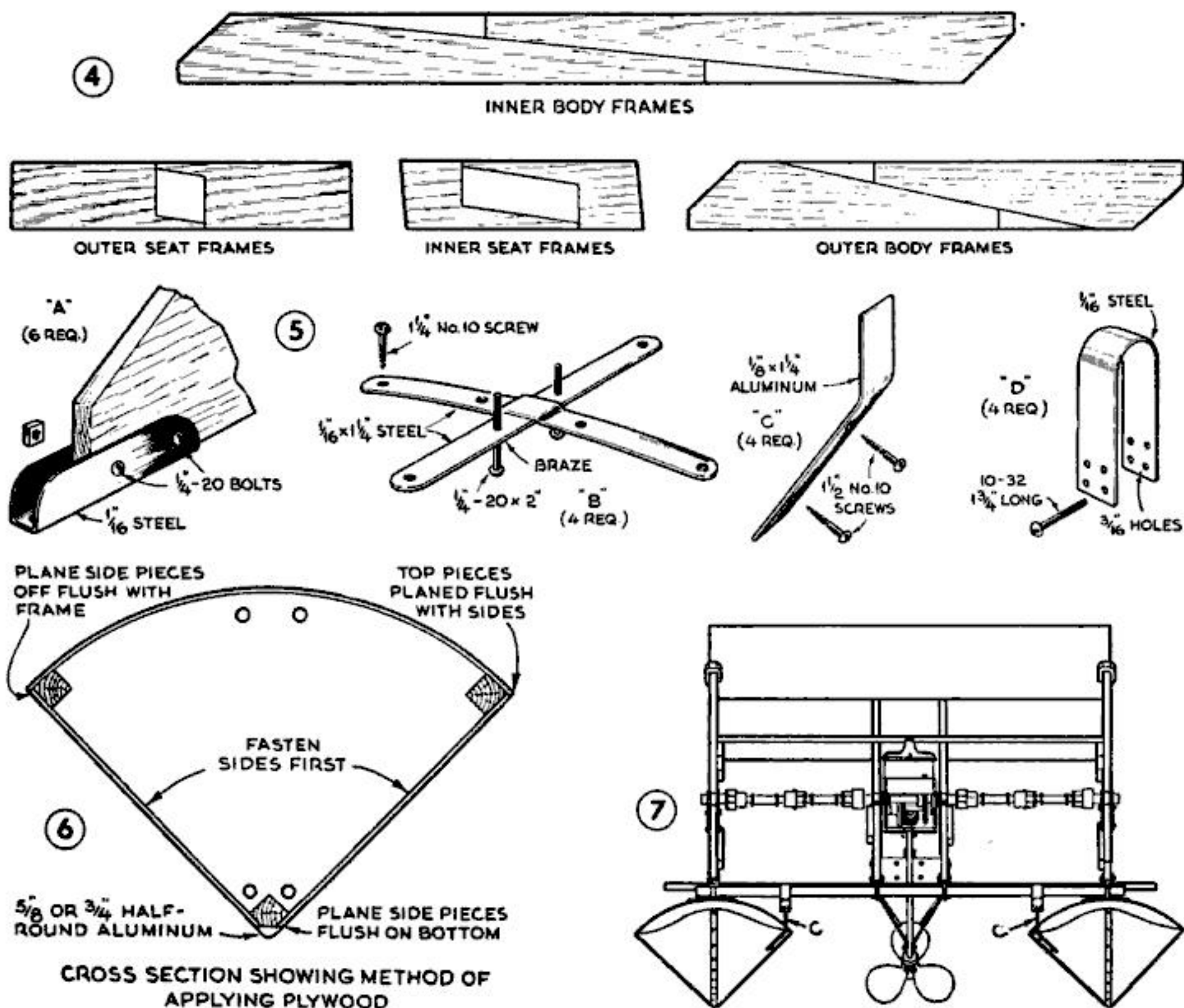
Make paper or cardboard patterns of each section before cutting the plywood. That will insure getting all the needed pieces out of the three plywood sheets. Or, if you prefer, lay the frame on the plywood and mark it.

To fasten the plywood to the frames, you'll need waterproof glue, about two gross of



Roomy seat easily carries two or three persons.





$\frac{3}{8}$ " No. 6 flathead brass wood screws, and some unbleached muslin.

On the center sections and the parts of the other sections where the curve of the frame is not too severe, the screws may be spaced 5" to 6" apart. Where the curve is sharper, spot the screws 3" to 4" apart. Lay out the holes first and drill and countersink them.

Cut the muslin into 1" wide strips. Glue the strips to the edges of the frame where the plywood will be applied. Spread another coat of glue over the muslin. Then place a section of plywood on the frame, screwing it down firmly. Fig. 6 shows you the method of fastening the plywood and where to trim off overhanging edges.

Cover the sides of the frame first. A couple of coats of paint, lacquer, or enamel should be applied on the inside of the pontoons. The top is put on in the same way as the sides.

After the pontoons are covered and the

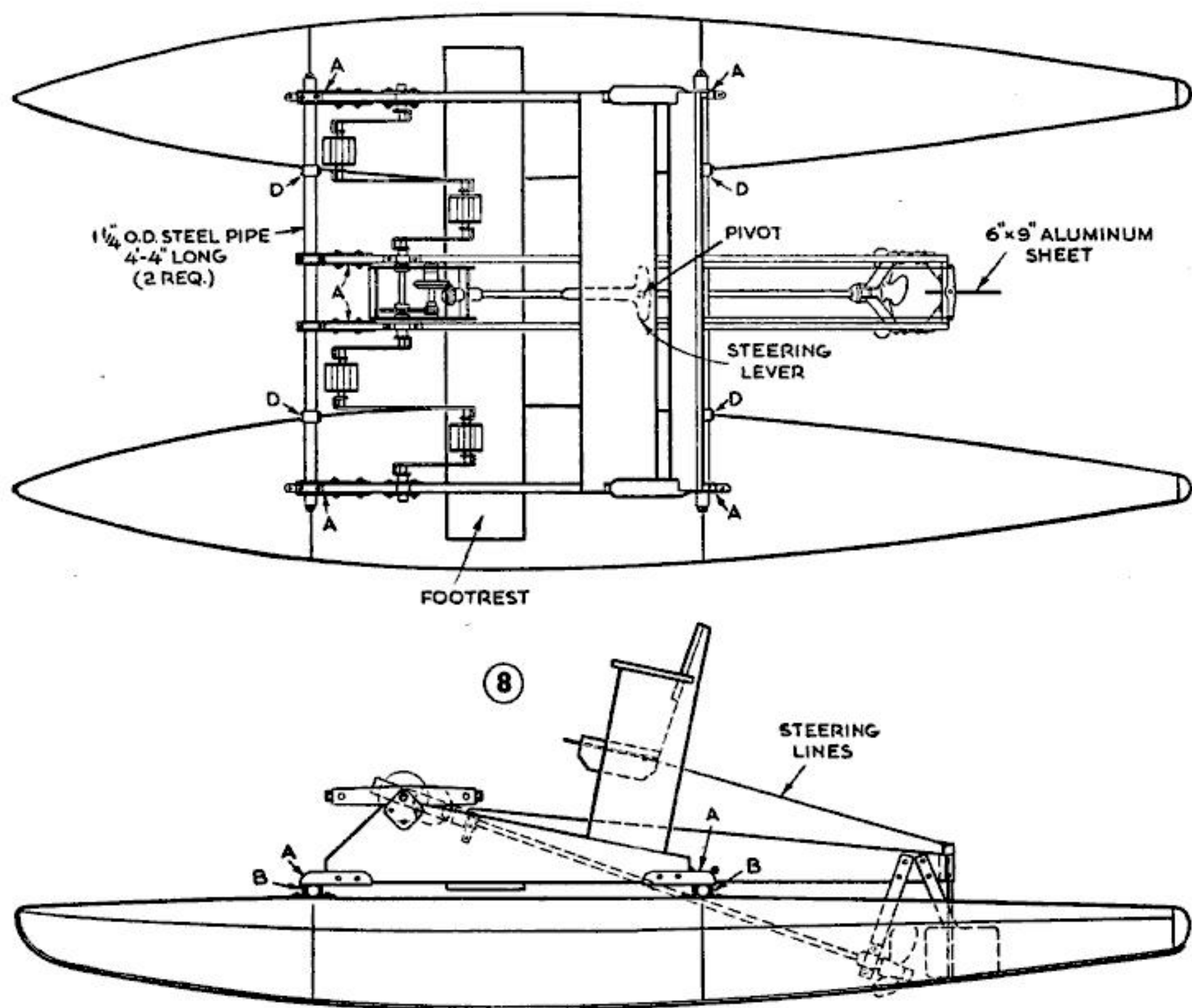
glue has set, attach the rear blocks. Fill all seams or rough spots with composition wood. Sand the entire job and cover with marine paint.

If you have difficulty bending the plywood on the few sections where the curve is severe, borrow your wife's electric iron. Pass the heated iron over the plywood a few times. The heat will make it easier to form a sharp curve.

After the paint has dried, fasten a  $\frac{3}{8}$ " or  $\frac{1}{2}$ " half-round strip of aluminum along the bottom of each pontoon. Form the strip all the way around the bow piece. Put the first screw into the top 1" by 1" frame member. Put the last screw into the rear block. Use 1" No. 6 flathead wood screws countersunk.

Cut the body frames and seat parts as shown in Fig. 4 from  $\frac{3}{4}$ " by 10" pine. The body frames taper from 3" to the width of the stock. Inner ones are 6' long, outer 3' 9". Fasten the parts together with flathead wood screws. The footrest, Fig. 8, also is





cut from pine—it's  $\frac{3}{4}$ " by 10" by 5'. Attach it to the bottom edges of the body frame by screws.

No dimensions for the seat are given. They'll depend on the size of the riders, who should be able to reach the pedals comfortably.

There are several methods of attaching the body of the boat to the pontoons. You may want to use the one given here or, perhaps, devise your own. In Fig. 5, A is a steel channel used to tie the frame to the pontoons. In the same figure, B is attached directly over the main pontoon bulkheads. The screws of B go into the top 1" by 1" frame and the bulkhead. The bolts of B run through holes in A, straddling the pipe cross-piece, which is clamped between A and B.

The stabilizing connectors, C in Fig. 5 and 7, are screwed into place directly over the joint in the plywood. The screws go into the main bulkheads. C is connected to the brace pipes by use of D. These fittings hold

the pontoons rigid. The entire body of the boat rests on the two pipes shown in Fig. 8.

The gears may be bought, or if you want to simplify the machine work, it is possible to use a large breast drill as the gear transmission.

If you want to eliminate the gears and the 10" to 14" propeller, a suitable mount for a small outboard motor may be built on the rear of the seat. Or, to simplify the driving machinery, you could use pedals but substitute a chain drive and a paddle wheel for the shaft and propeller. An auto generator powered by a storage battery could also be used to drive the propeller (PS, June, '47, p. 185).

For its size, the boat is light in weight. Using plywood as pontoon covering, my boat weighed about 230 lb. The pontoons scaled about 40 lb. each and the frame about 150 lb. An advantage of the metal parts I used to join pontoons and body is that the pontoons may easily be detached from the frame for winter storage.

END



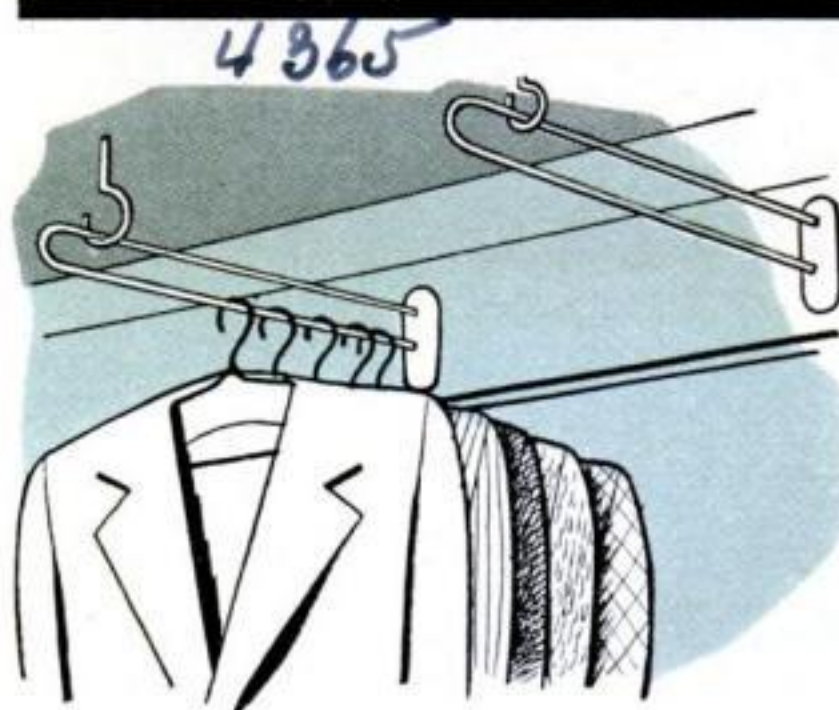
## Keeping the Home Shipshape



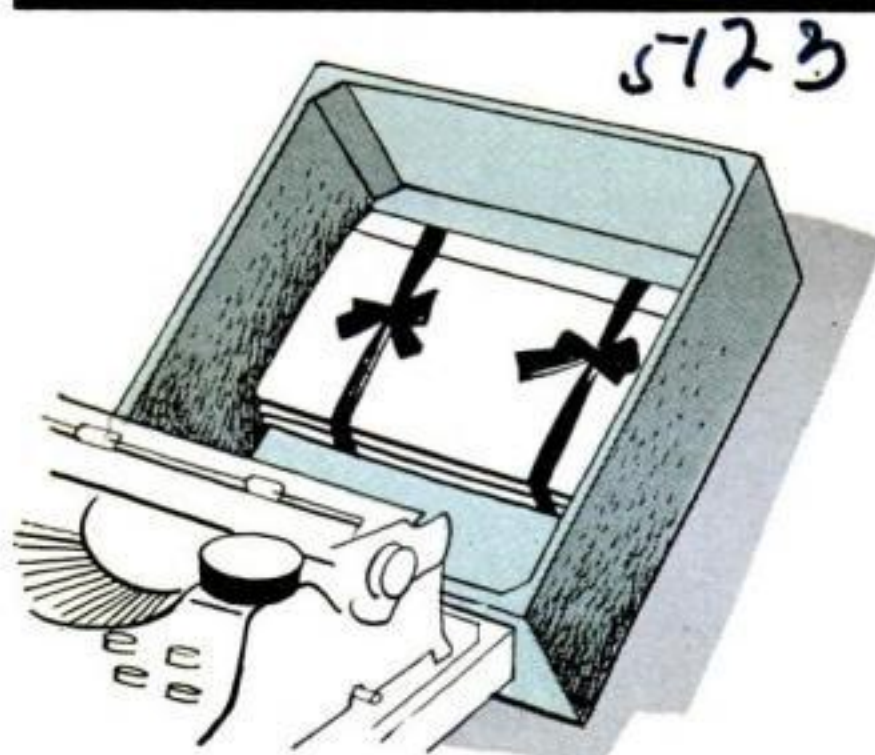
**Waste linoleum** cut into pieces of uniform size may be fitted together to cover small or odd-shaped areas. If the linoleum has a pattern, cut squares or rectangles to suit.



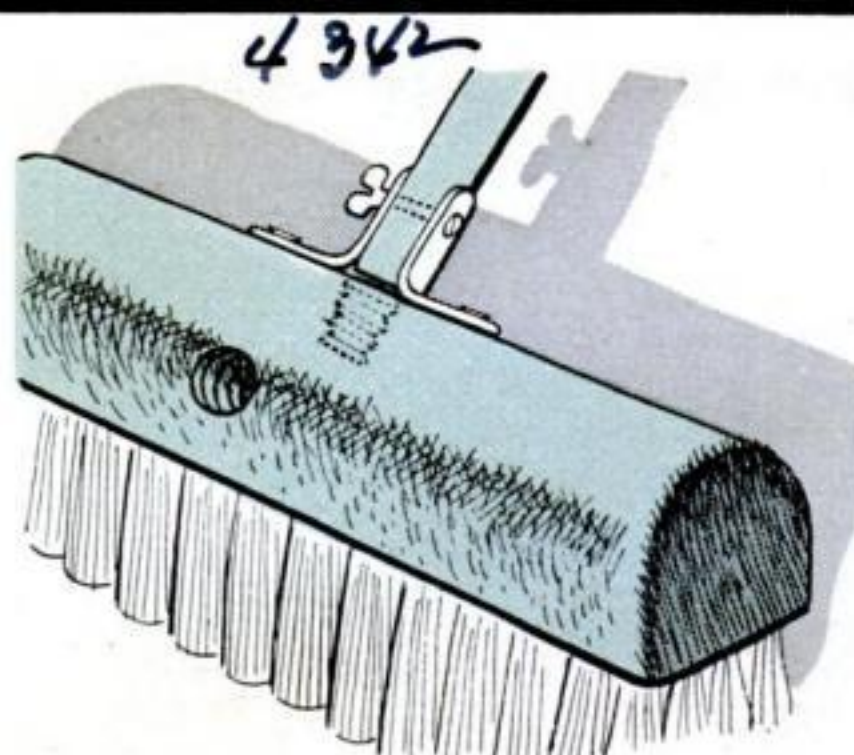
If paper sticks to a polished wood surface, drop on a little olive oil. When the paper is soaked, it will peel off without damage to the finish. Just wipe off excess oil.



**Some closets** are so shallow that you can't hang clothes on a pole extended from side to side. In such cases, metal towel racks supported by a hook are a good solution.



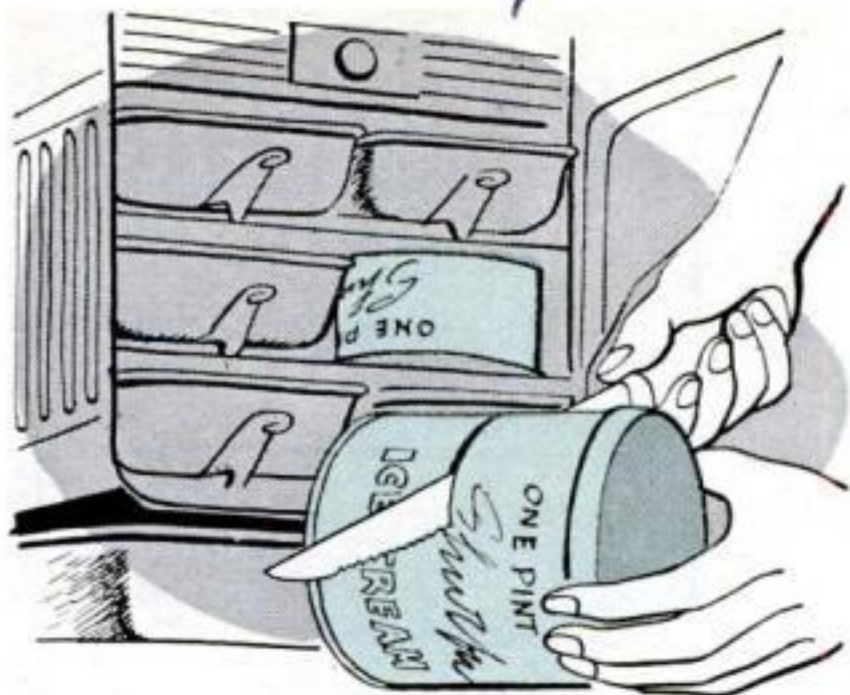
A **file folder** cemented inside the top of a portable typewriter case will keep writing supplies handy. Glue ribbons to the folder, leaving the ends long enough to tie.



**Angle braces** reinforce a push-broom handle where it's weakest and hold it in despite worn threads. Use wood screws in the brush head. Drill the handle for a bolt and wing nut.

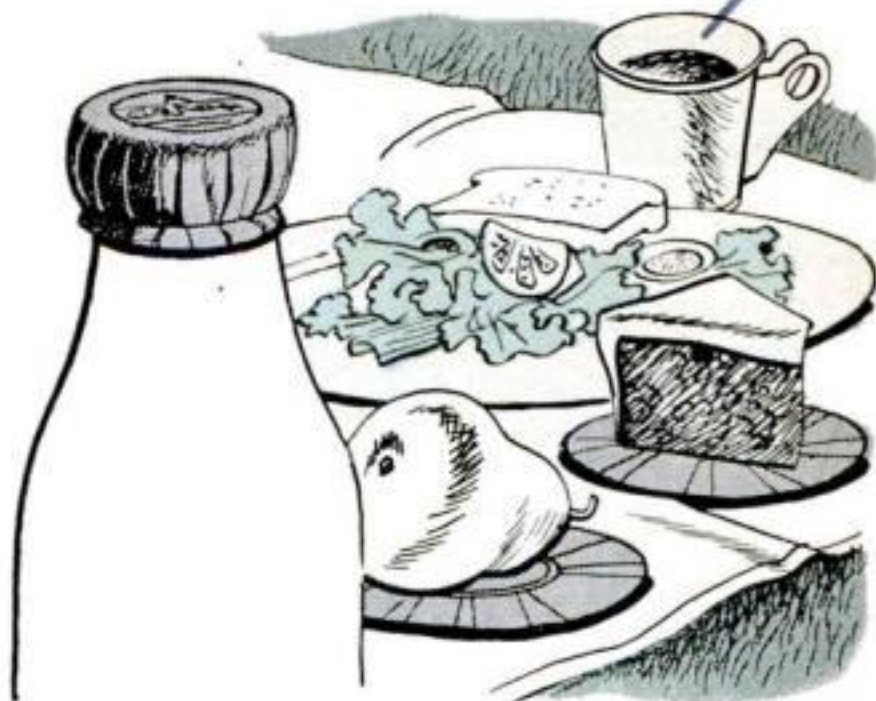


4007



Ice cream packaged in pint cartons can be quickly stored by cutting the carton in half. Put wax paper on the open ends. Each part will then fit in the freezing compartment.

3057

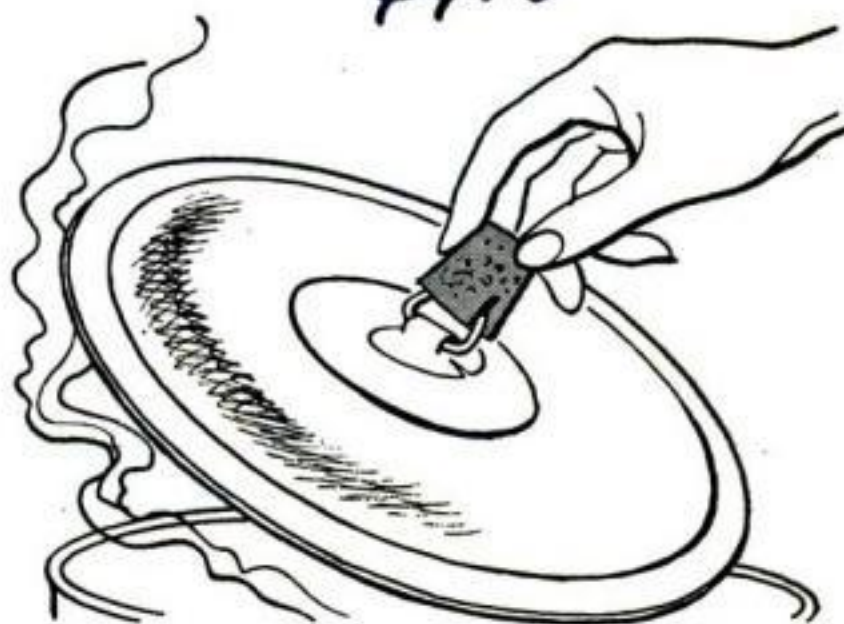


When you're on a picnic, milk-bottle caps can be put to use. Flatten them out and you have neat little plates for individual servings. Use them as coasters too.



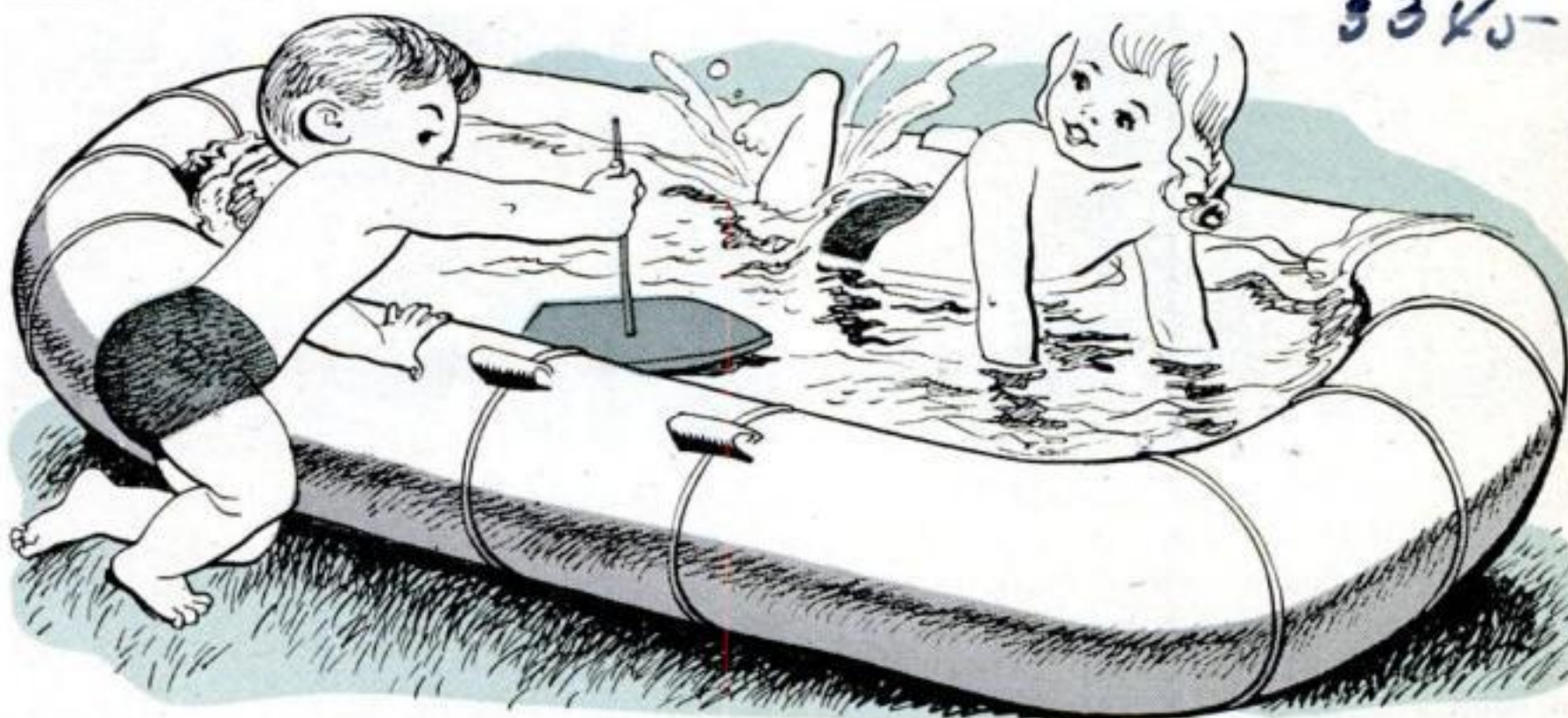
A handy small scoop for use in the kitchen can be shaped from an inexpensive teaspoon. Bend up the sides, leaving a narrow opening at the front, and loop the handle downward.

4415-



Pot covers are a frequent source of burns. You can lift them with ease, however, if the metal ring is equipped with a cork in this manner. Slit the cork about half way.

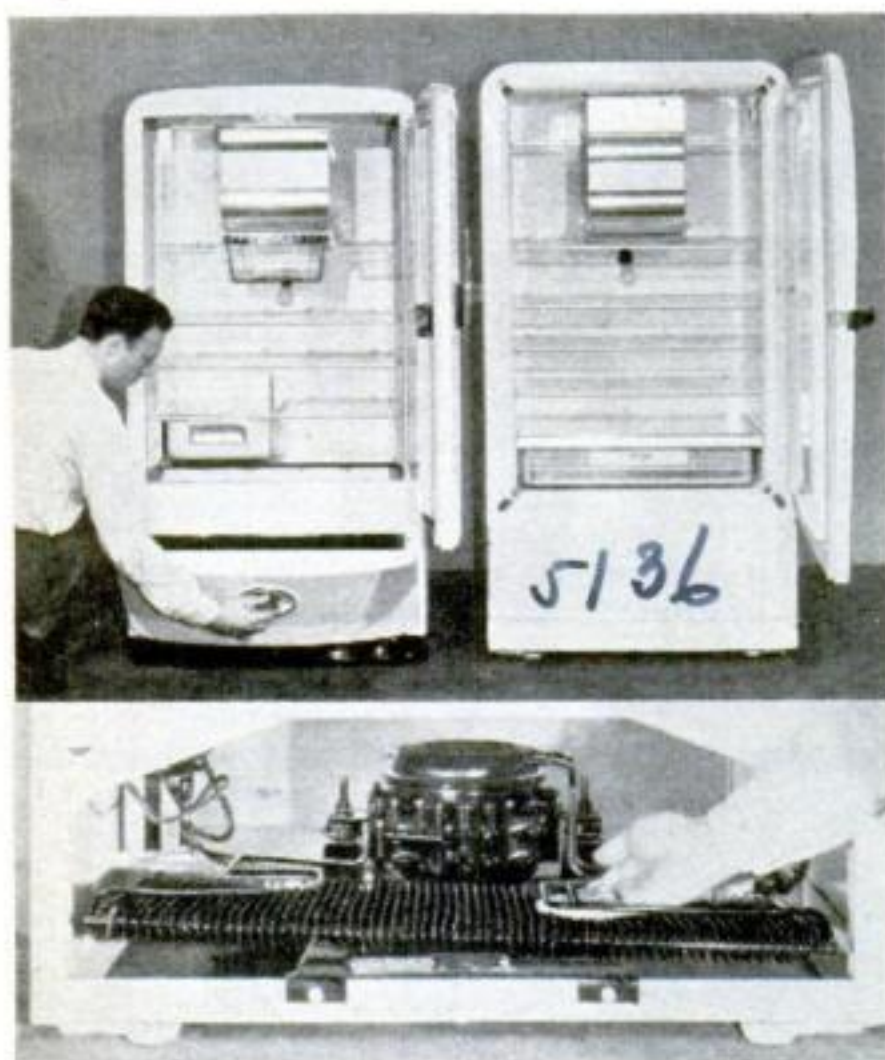
3340-



Rubber boats of the type obtainable as war surplus make fine wading pools for small chil-

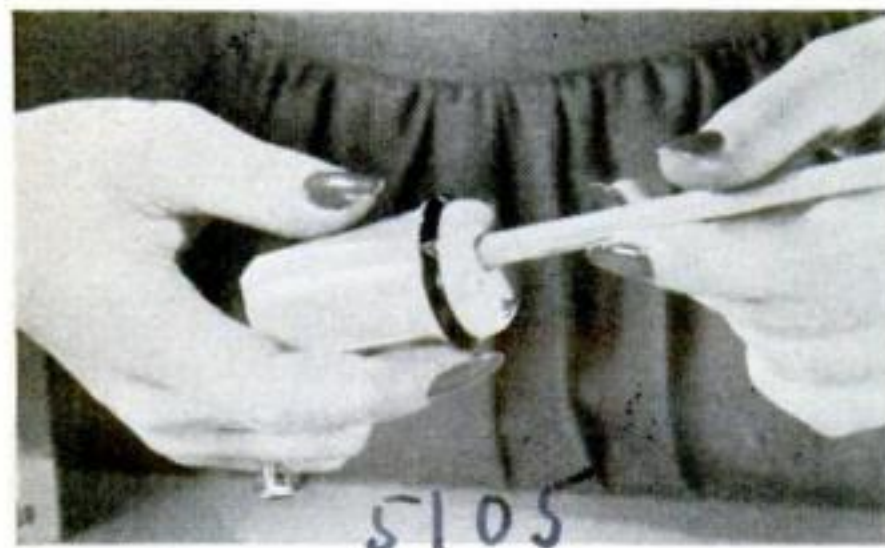
dren. Without the water, the boat also can be used as a pen for a baby too small to get out.





### **New Refrigerator Saves Space.**

In the new Frigidaire <sup>®</sup>, nearly two cubic feet of refrigerated space has been added without materially increasing the overall size. At the left above is last year's seven-cubic-foot model, at the right the new nine-cubic-footer. Most of the added space was gained by redesigning the compressor and condenser as a flatter unit—shown in the lower photo. The new models have a full-width vegetable compartment.



### **Sharpener Points Three Ways.**

By turning the indicator cap, you have a choice of three points with this pencil sharpener—standard, long-lead blunt, or long-lead sharp. The hollow-ground blades are readily replaceable, and the cap twists off for emptying. Triple "E" Products, St. Louis, Mo., makes it of Bakelite <sup>®</sup> in several colors.



### **Bathroom Convenience.**

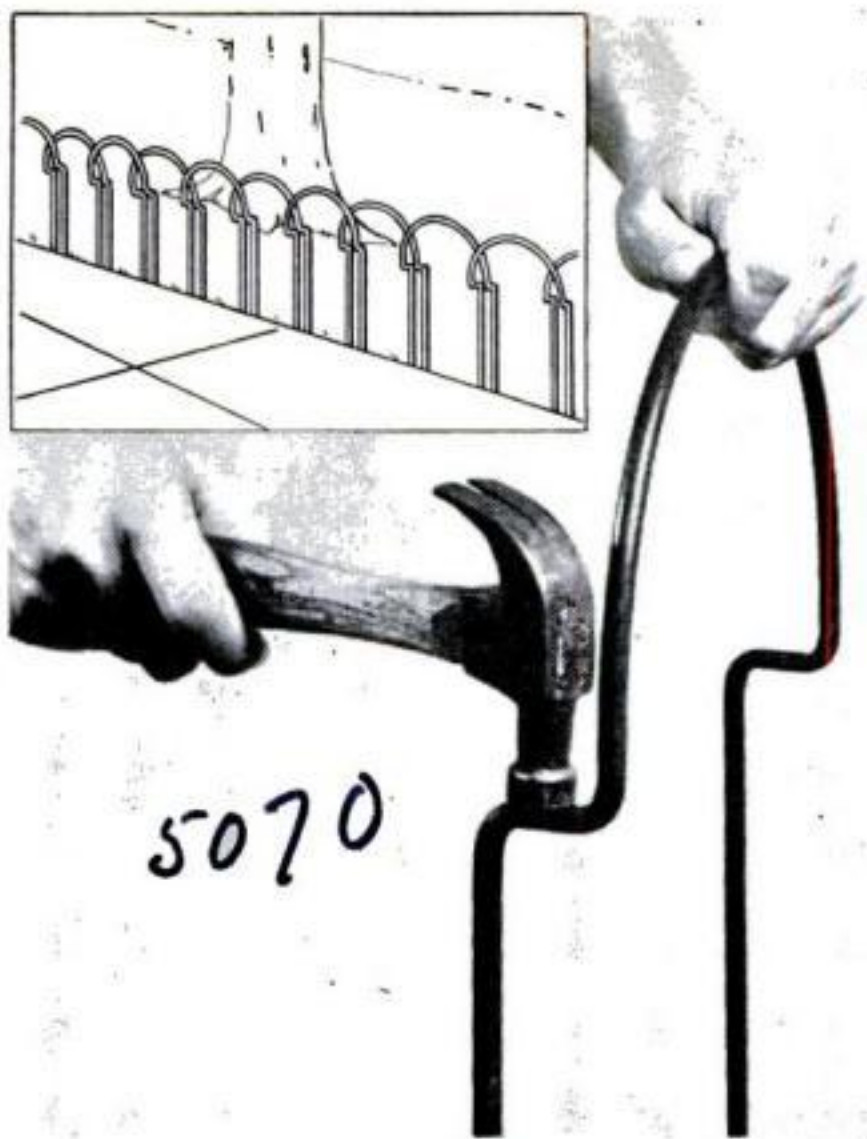
This bathroom fixture is marketed by the House of Hospitality, North Hollywood, Calif. Recessed between two studs, it measures 12" by 17 $\frac{1}{4}$ " inside. Separate compartments hold books, magazines, newspapers, cigarettes, matches, ash tray, toilet tissue, and other articles. Made of steel, it is enameled in a choice of six colors to harmonize with various bathrooms. The price is about \$17.



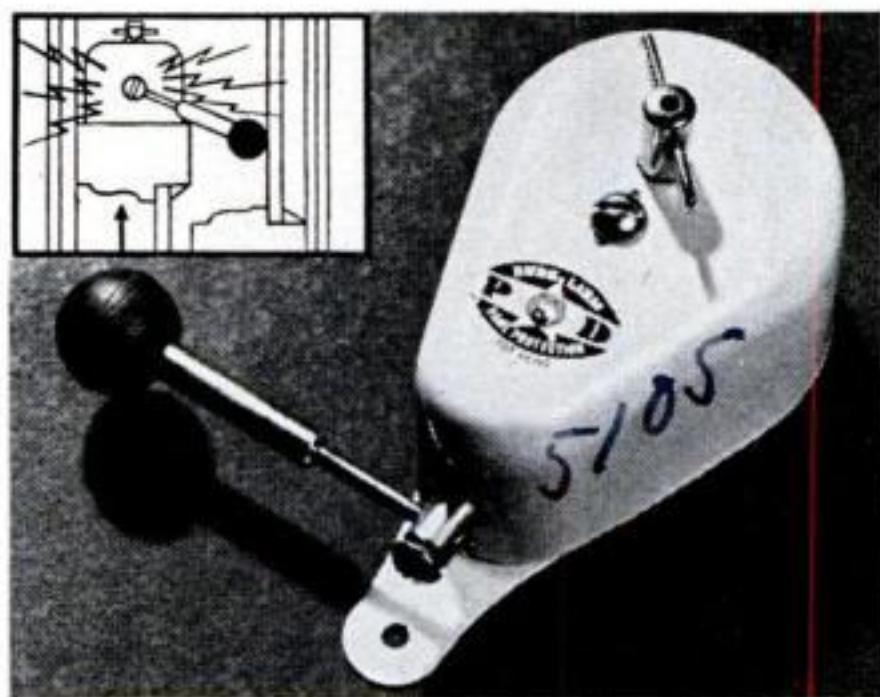
### **Clip Holds Back Ice.**

In the January issue of POPULAR SCIENCE (p. 112), Mrs. W. S. Wilbur wrote that she would "like to see them make" drinking glasses with ice guards. Such a device is now on the market. Made of plastic by the Sel-Gold Novelty Co., Arverne, N. Y., it clips to the glass, as above, to keep the ice in place.





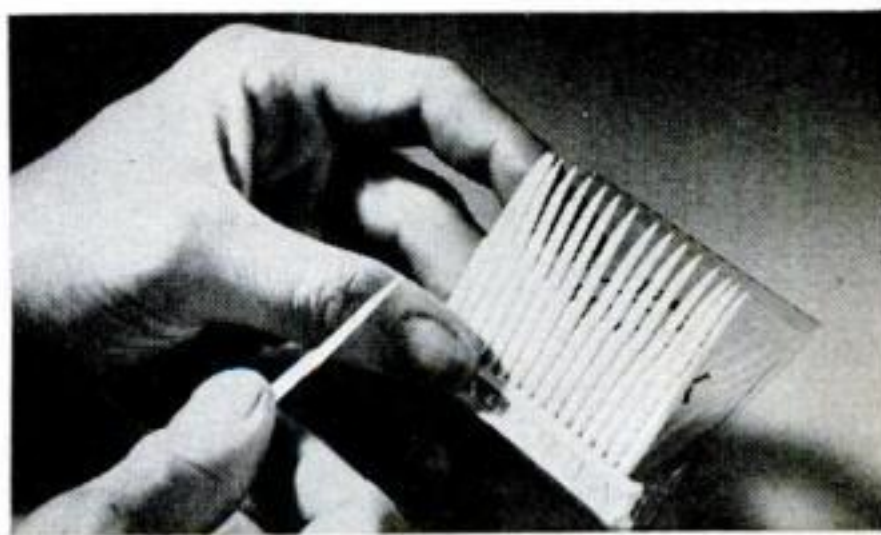
**Wickets Form Lawn Fence.** Decorative fencing for your lawn or flower beds may be quickly provided with individual wickets now available. Made of  $\frac{1}{4}$ " steel rod, enameled green, the wickets are 12" wide and 20 $\frac{1}{2}$ " high. They are driven or thrust into the ground as you would a croquet wicket. A carton of 24 will make a fence 24' long. The fencing is a product of the Stikit-Wikit Co., Washington, D. C.



**Alarm Warns of Intruder.** Operated like a spring-wound alarm clock, this device sounds a warning if a door or window is opened. The alarm remains silent as long as the bumper arm remains at right angles as in the photo. If a door or window moves the arm, the bell rings. R. E. Robertson and Co., Chicago, makes the alarm.



**Cook Standing Up.** A gas range produced by the Hardwick Stove Co., of Cleveland, Ohio, keeps cooking operations at a convenient height. The oven is located at the right of the open burners, the broiler below the oven. All the space below is for storage. The oven has a transparent door. By snapping on an interior light, you can check up on your baking. When the oven is dark, the glass serves as a mirror. There is also a light under the clock shelf.



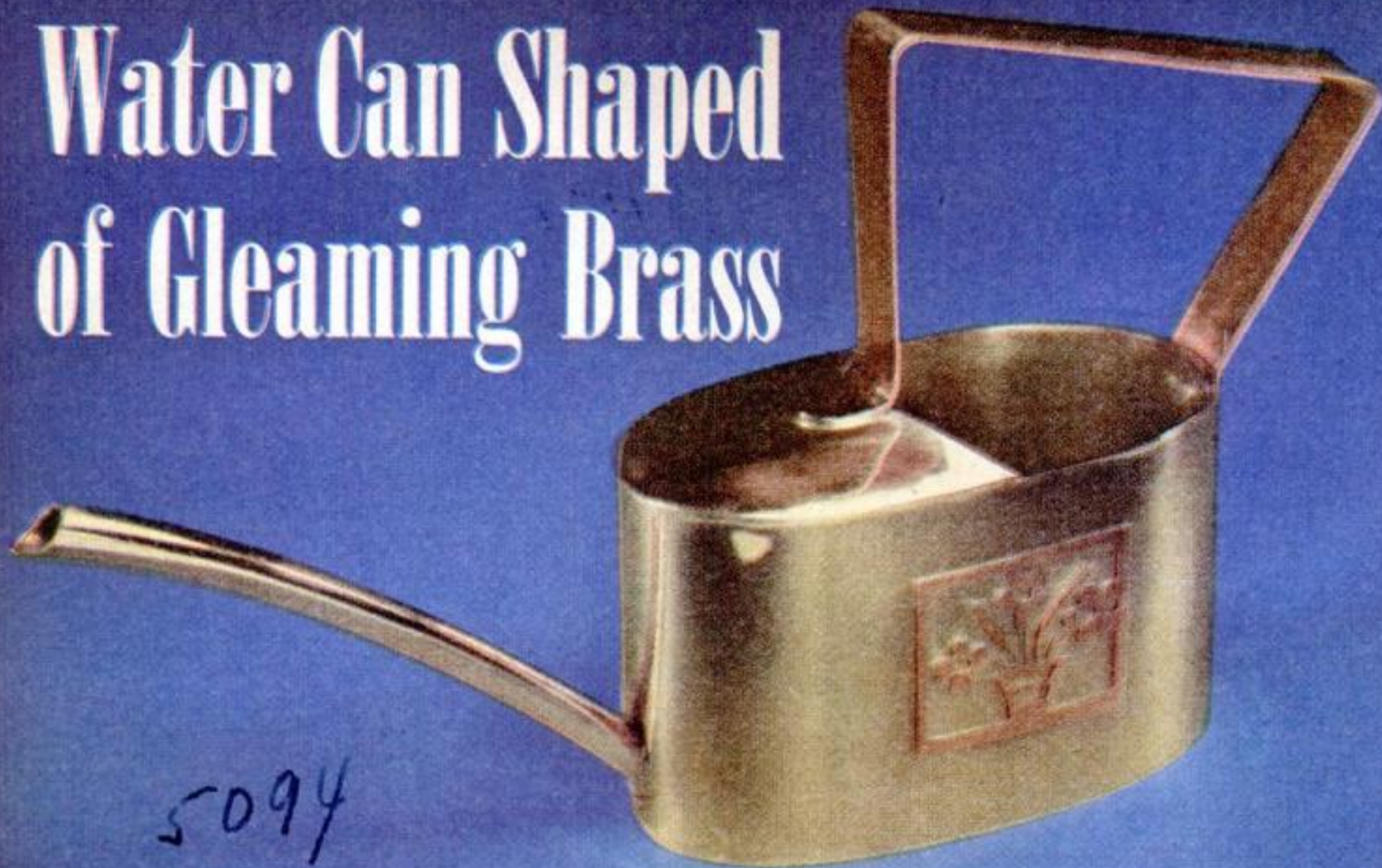
**Toothpicks Made of Plastic.** Packaged in a handy pocket case, these plastic toothpicks are said to stimulate the gums as well as clean the teeth. Individual picks are removed from the plastic base like a match. They are made in two textures, hard and regular. Lactona Incorporated, St. Paul, Minn., is the manufacturer.

4473

JULY 1948 171



# Water Can Shaped of Gleaming Brass



**By Bill Luther**

**B**ESIDES being decorative, this little water can is useful. It's just the thing for watering potted plants indoors. But if you don't want to devote it to such a utilitarian purpose, you can plant it with ivy or simply keep it as a shelf ornament.

The body and bottom are 20-gauge brass. For the body, cut a piece 3" by 13½" and form the curved ends around a 2" pipe or rod. Overlap the ends ¼" and sweat-solder them together. Then trace around the inside of the body on another sheet of brass. Cut out this oval, flatten it on a metal plate with a mallet, and solder it in place ¼" from the edge of the body.

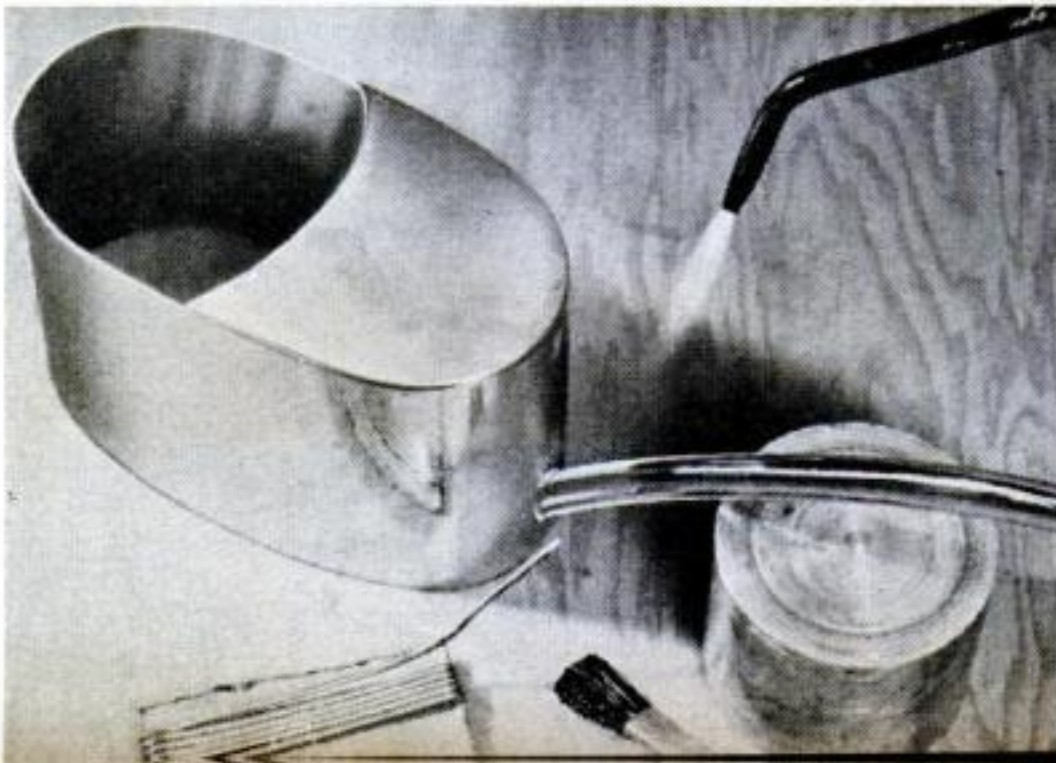
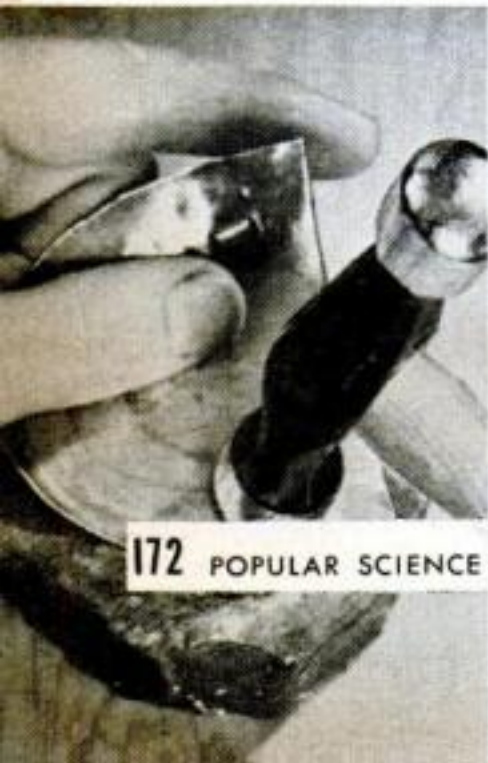
**Shape the hood** with a ball-peen or forming hammer. Planish out tool marks (right below).

Cut the hood to approximate size from 22-gauge copper. Then anneal it. On the under side draw several pencil lines ¼" apart following the contour of the curved edge. While holding the copper on a lead block, turn up the edge with a ball-peen hammer. Use the pencil lines as guides to space the blows evenly.

After annealing again, place it over a metalworking stake clamped in a vise and planish out the peen marks. Use a smooth-faced planishing hammer and light, glancing blows. If a stake isn't available, you can round the end of a 1½" rod or shaft. When the planishing is completed, cut the inside curve and buff out any tool marks.

Next, tin the under edge of the hood

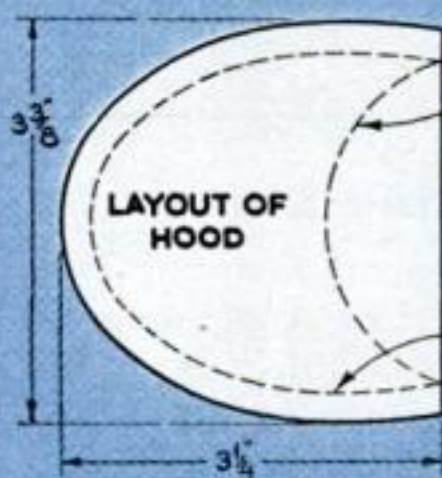
**Support the spout** like this for soldering. Use a minimum of solder and wipe off the excess.







**COPPER PLAQUES FOR BODY SIDES (FULL SIZE)**  
(MAKE TWO FROM 22-GAUGE COPPER)



**LAYOUT OF HOOD**

NOT CUT UNTIL AFTER SHAPING, PLANISHING, AND BUFFING

APPROXIMATE SHAPE AFTER SHAPING AND SOLDERING TO CAN. EXCESS IS CUT AND FILED FLUSH



**SIDE VIEW OF FINISHED HOOD (22-GAUGE COPPER)**

THE PLAQUES ARE SAWED OUT WITH A JEWELER'S SAW AND THE OUTLINES SMOOTHED WITH NEEDLE FILES

ENDS ARE FORMED TO FIT CURVATURE OF HOOD, AND BACK OF BODY

DRILL FOR ENTRANCE OF SAW BLADE



**HANDLE**  
(18-GAUGE COPPER)

HOOD

**BODY**  
(20-GAUGE BRASS)

**SPOUT**

(3/8 x 5/8 COPPER TUBING)

3/8 HOLE

20-GAUGE BRASS BOTTOM  
(SOLDER FROM UNDERNEATH)

and wire it to the body. Tiny notches filed in the edges of both pieces will keep the wires from slipping. Heat with a torch, adding solder from inside. Saw off the projecting edge and file flush with the body.

Now start up your buffing wheel and give the entire can a good going over. Don't be in too much of a rush. Skipping portions now will impair the final finish.

Drill the 3/8" hole for the spout so that it's centered and just touches the bottom. Cut the spout from 3/8" copper tubing, shape it, buff out all marks, and carefully fit and solder it in place. Use a minimum of solder, wiping off the excess with a small cloth wrapped on a matchstick.

Transfer the plaque design to 22-gauge

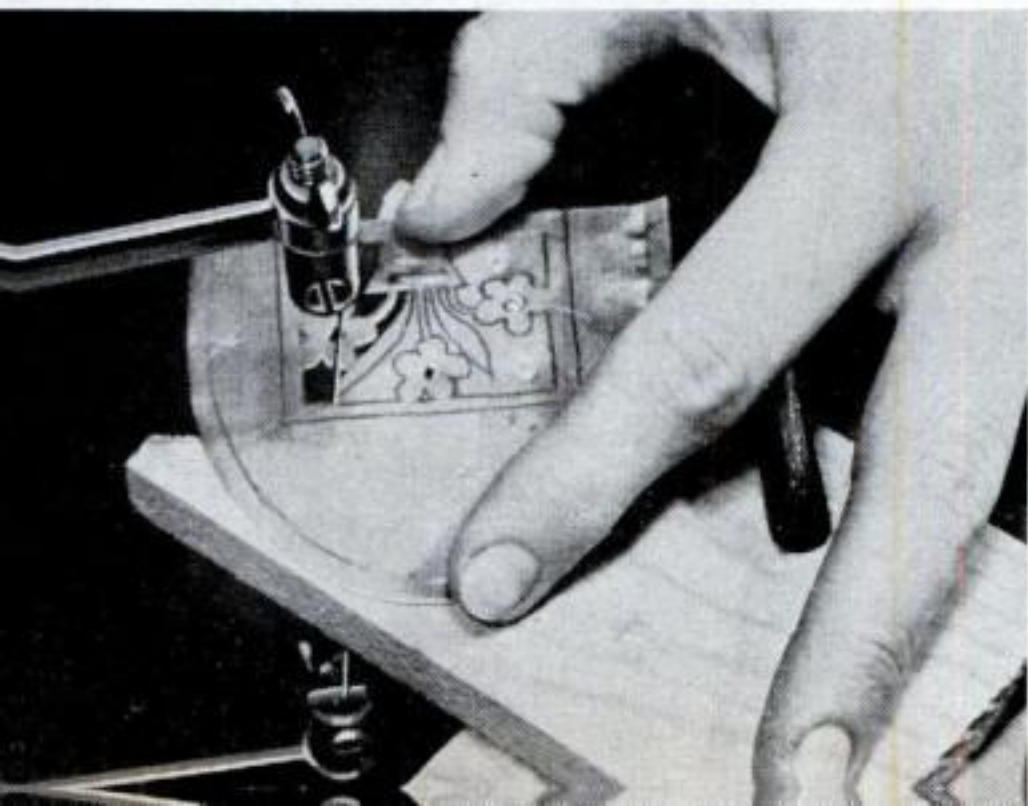
copper with carbon paper. After filing the cut edges, tin the backs of the two plaques, apply flux, and bind them to the sides of the can, being careful to get them straight. Sweat-solder in place.

The handle is a 3/4" by 11 1/2" strip of 18-gauge copper. Form the ends to the curves of the body and hood. After tinning and fluxing these ends, bind the handle in position and sweat it on. To keep other soldered joints cool, pour about an inch of water in the can and place wet pads around the hood-body seam.

Buff the entire can thoroughly, clean it with a rag saturated with lacquer thinner, and then polish with a clean dry rag. As the final step, coat with clear lacquer. **END**

**Cut the plaques** with a jeweler's saw. A sheet of scrap was used for the one pictured here.

**Sweat-solder** the two plaques in place after tinning, fluxing, and binding them with wire.

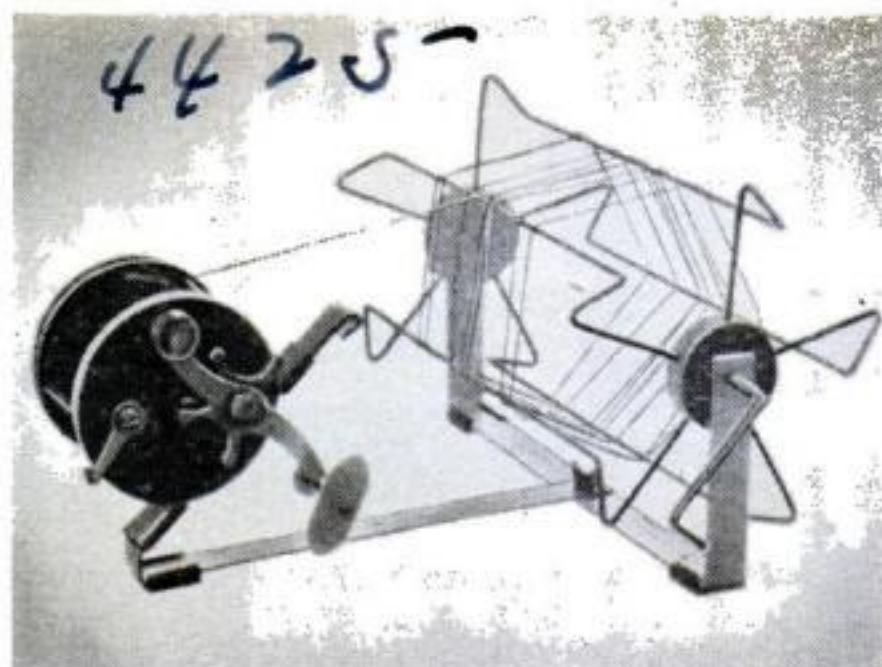






### Shingle Packet Aids Repairs

SMALL repairs to shingle roofs and sidings usually require you to buy much more material than is needed. With this difficulty in mind, the Portland Shingle Company, of Portland, Ore., now offers a package containing everything you need for small jobs. It contains 50 red cedar shingles, a packet of nails, and instructions.



### Frame Dries Fishing Line

A METAL drying reel manufactured by Bonnie Products Co., of Los Angeles, accommodates 1,000 yards of fishing line. The steel cross members that compose the drying unit are treated to prevent rust. A simple seat for the fishing reel is provided. The drier, which is light enough to carry along on trips, is priced at about \$2.

### How Much Paint's in the Can?

WHEN you have finished a job and have some paint or enamel left, it is a good idea to paint a line on the outside of the can before sealing—at the level of the remaining paint. This will enable you to tell quickly how much is left and what color it is.—*Benj. Nielsen, Aurora, Nebr.*

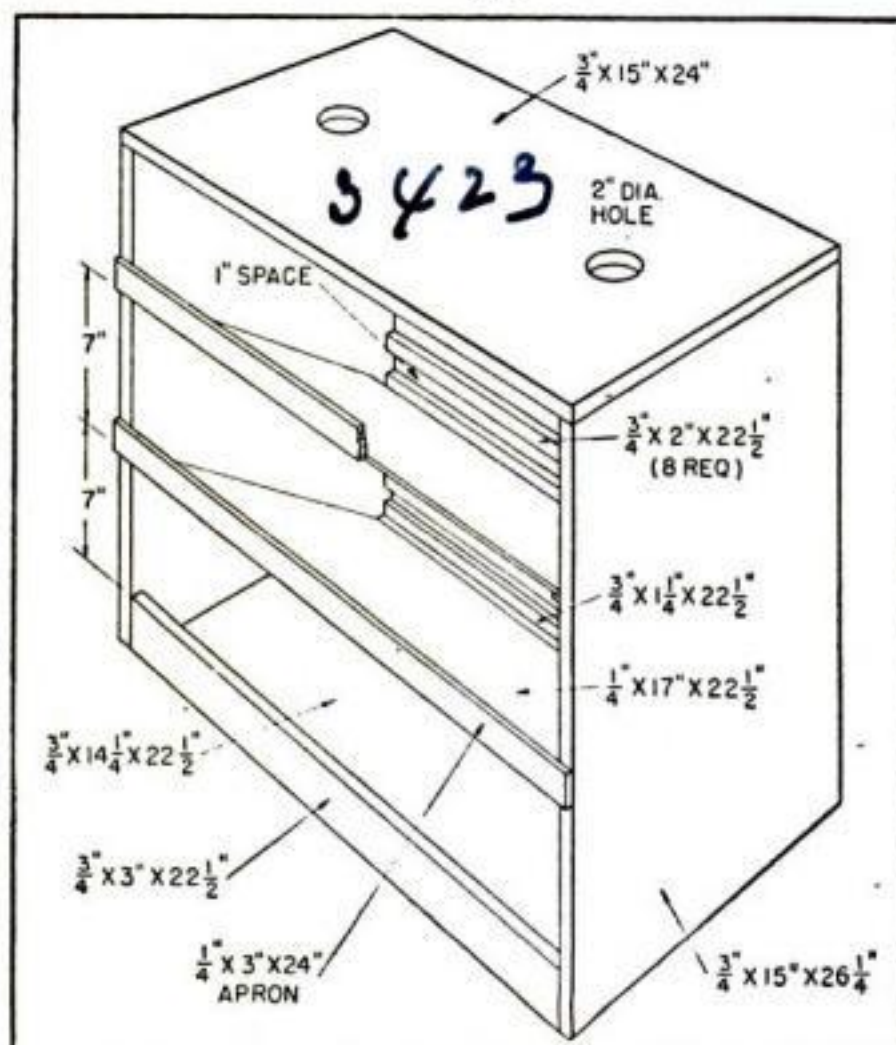
## Small Kitchen Bin Stores Fruit and Vegetables

SEPARATE bags of onions, potatoes, oranges, and apples clutter up the cupboard shelves in many kitchens. A portable bin to accommodate all of them neatly will win you a big vote of thanks.

All parts except the two  $\frac{3}{4}$ " by 17" by  $22\frac{1}{2}$ " pieces for middle and upper shelves can be cut from a 3' by 6' panel of  $\frac{3}{4}$ " plywood. Although the drawing calls for  $\frac{3}{4}$ " stock in the two aprons, the large panel also will yield these if you wish.

Butt joints are used throughout, and the parts are assembled with glue and finishing nails, set and then filled. Narrow cleats support the two shelves. To give carrying hand holds, saw out two holes in the top. Sand the edges of these smooth.

When the bin is assembled and the nail holes filled, sand it and apply two coats of enamel that matches the kitchen trim.—*Norbert Engels, South Bend, Ind.*





# Car-Top Carrier Adds Outside Luggage Space

3451

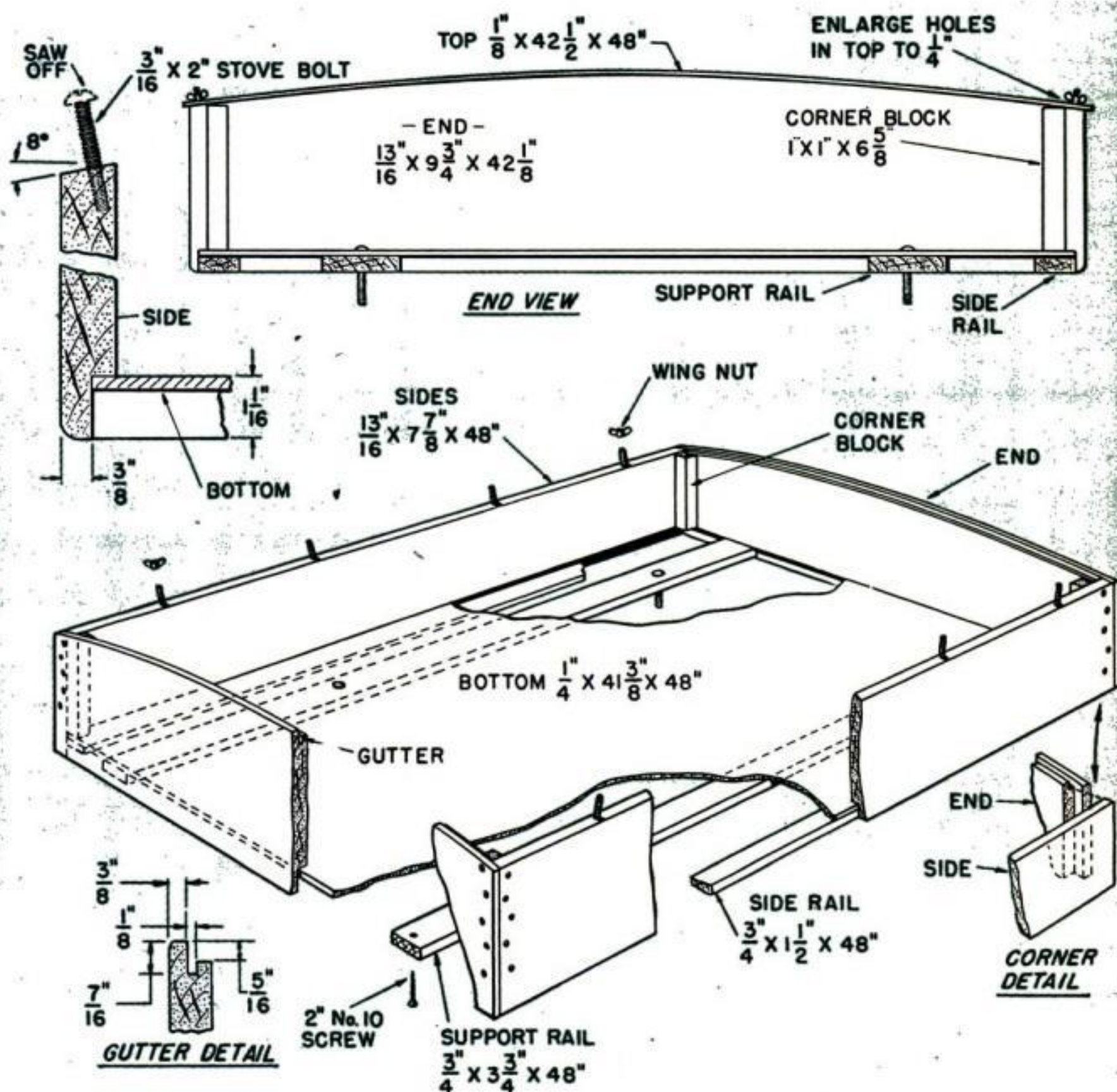


THERE'S little chance that rain will damage luggage in this carrier. Wind can't drive rain in, for the curved top panel rests below the ends. Drainage gutters in the ends carry off any seepage.

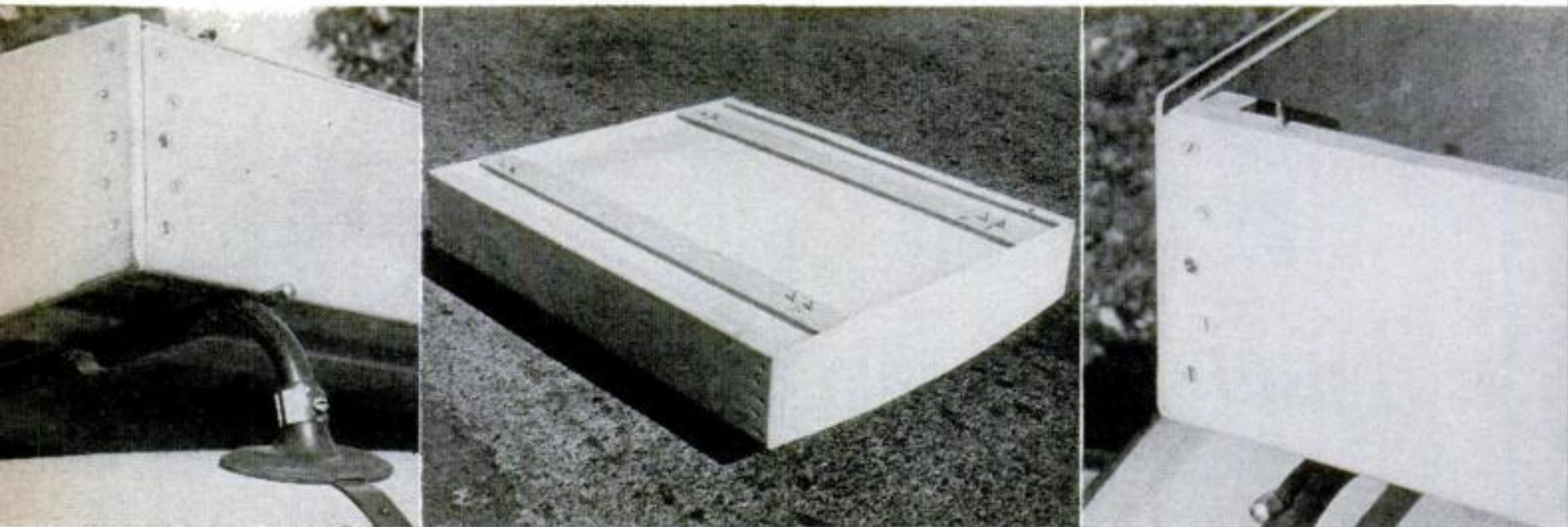
Make the ends and sides first, using white

pine. Joint one edge of the stock and cut the pieces to finished length. Lay out the curve on each end and bandsaw to outline. Then clamp the pieces together and sand or plane smooth any irregularities.

Forming the gutters is easy on a shaper,







A rack to hold the box on the car top may be purchased. Attach the box with carriage bolts and pipe straps. A drainage gutter in each of

the endpieces (right) carries off any surplus water. Note that a small notch should be cut in the sides in line with the gutters.

or with molding cutters on a drill press. Lacking that, use a dado head on the circular saw. Hold the stock vertically against the rip fence and rock it as you work. Make the shoulder for the top panel by holding the work flat on the saw table. Take several cuts at a tangent first. For the finish cut, rock the work against a guide line marked on the fence at the center of the blade.

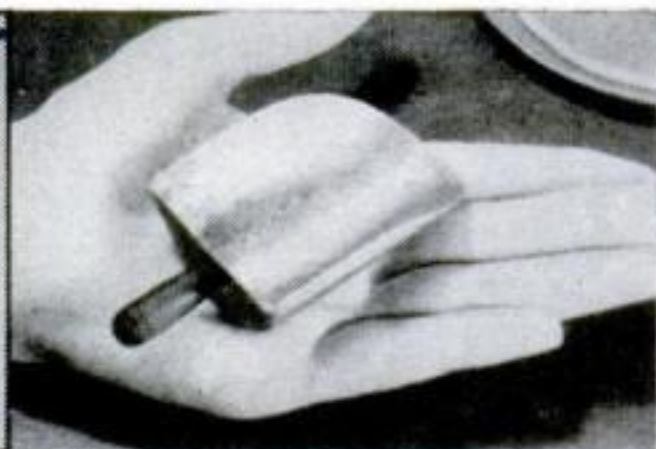
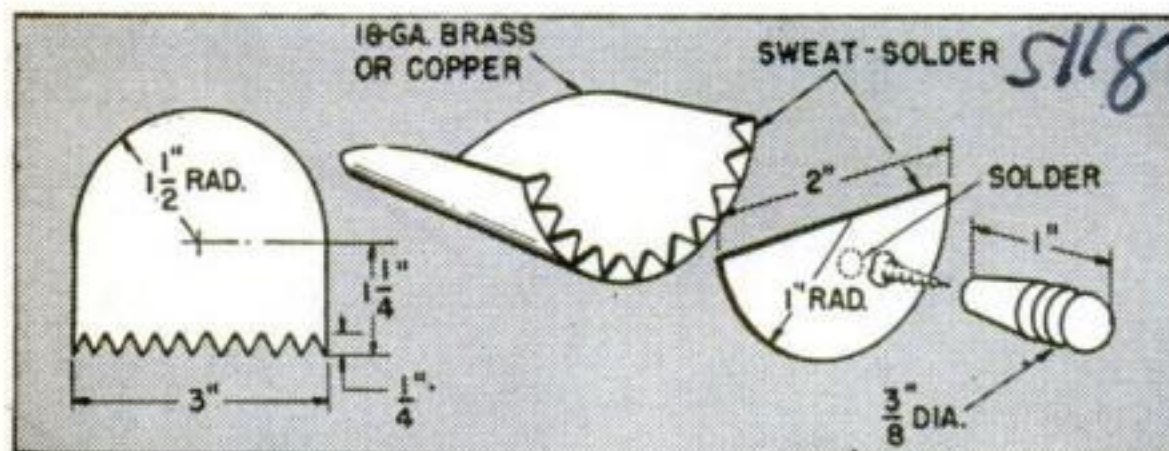
Cut a rabbet inside the bottom edge of all four pieces, using the same saw setting for each. Next, saw rabbets in the endpieces to take the sides. Then make a trial fitting of one end and side to determine the angle at which the sides should be beveled.

Assemble the ends and sides with 1½" No. 10 flathead wood screws, driven into the corner blocks. Angle iron may be sub-

stituted for the blocks if desired. Cut the bottom plywood panel to fit the rabbets. Attach with ¾" No. 6 flathead screws.

Fasten the side and support rails to the ends with 2" No. 10 flathead screws. Attach the bottom panel to the rails with ¾" screws. Cut the top panel so that it just drops between the ends and extends beyond the sides about ⅛".

With the top panel in position, lay out and drill four bolt holes. These should be small enough so that 3/16" by 2" stove bolts may be threaded into the sides. Saw off the heads afterward and equip the bolts with wing nuts. Enlarge the holes in the top panel to slip over the bolts easily. Sand the box smooth, and paint or lacquer it to harmonize with the finish of the car.—*Glenn A. Wagner, Delmar, N. Y.*



## Scoop Fills Tobacco Pouch Without Spilling

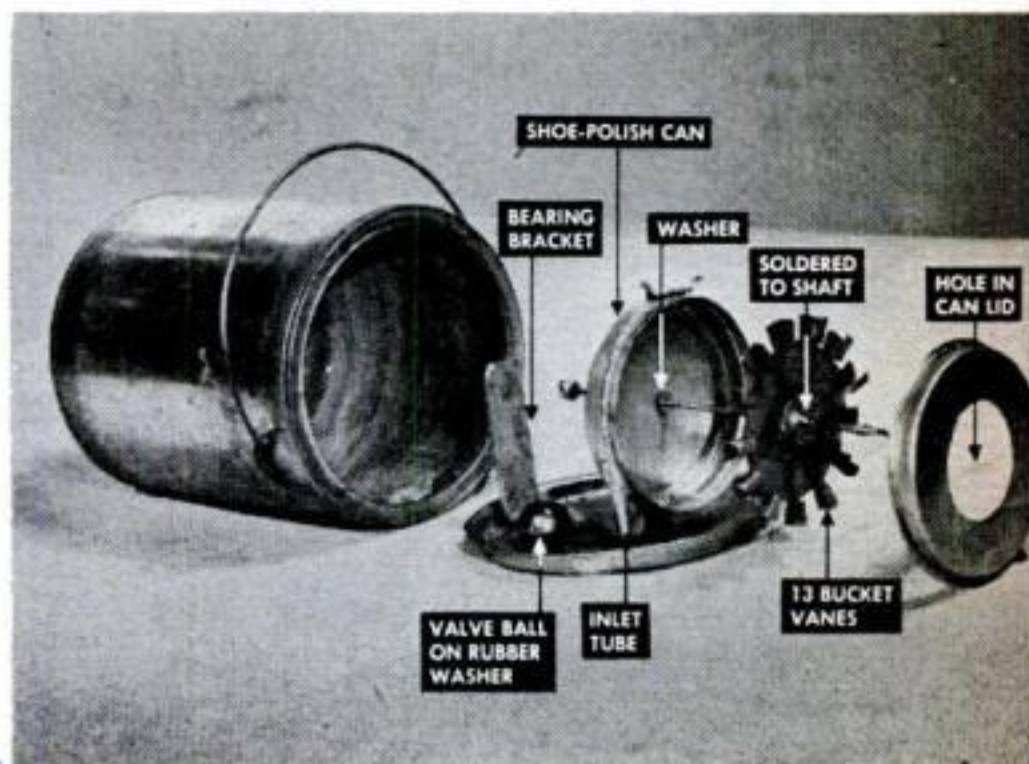
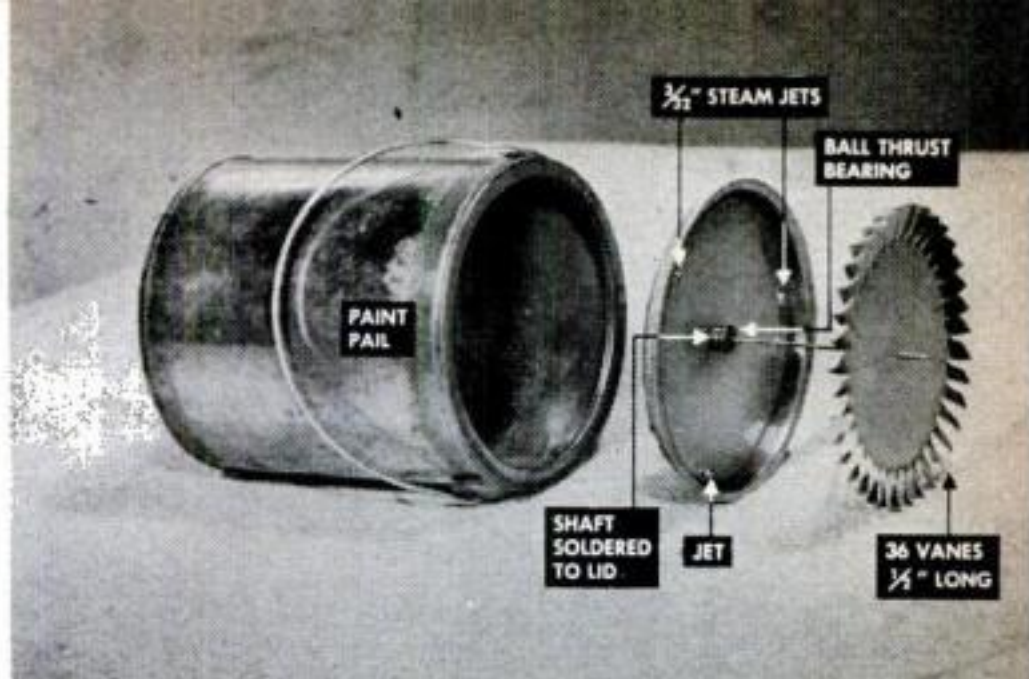
THIS little scoop finally ended a long family feud. With it, I can now fill my tobacco pouch from a humidor or 1-lb. can—and get none on the floor.

Cut the body to shape with tin snips, notching one edge as indicated. Bend in these projections, and sweat-solder the semi-

circular end to them. Turn or carve a small ornamental wood handle, drill it for a flat-head wood screw, and solder the screw head to the end of the scoop.

I tried to buy a suitable scoop. All were too long to fit inside the humidor. This one isn't.—*A. Zanelli, Clifton, N. J.*





Photos by General Electric

## Toy Turbines Made of Paint Pails

THESE two tin-can working models afford a simple introduction to turbine principles. One, shown at left above and top right, has a horizontal rotor; the other has a vertical one in a shoe-polish can. Use paint pails with pry-off lids, and press them on lightly so they'll dislodge if pressure gets too high.

To make the horizontal turbine, solder a wire through the center of the lid. Punch three holes near the edge for jets, and give them a twist with a nail so they'll face the vanes. Cut a tin-plate rotor, punch a center hole, and bend the vanes. Use a glass bead or model-plane thrust bearing on the shaft.

For the other, cut a bucket rotor to run

in a shoe-polish tin. Through its exact center solder a knitting-needle shaft. A U-shaped bracket on the lid holds the bottom of the polish can; steam enters it tangentially through some  $\frac{3}{32}$ " tubing that's also soldered through the pail lid. The polish-can lid has a large central hole for exhaust. As an extra safety valve, punch a  $\frac{1}{4}$ " hole in the lid, cement a rubber washer around it, and put a  $\frac{1}{4}$ " steel ball or marble on it. Partly fill the pail with water and put on the stove.

The models were designed and built by Larry Buckland (above), both of whose parents are engineers for General Electric.

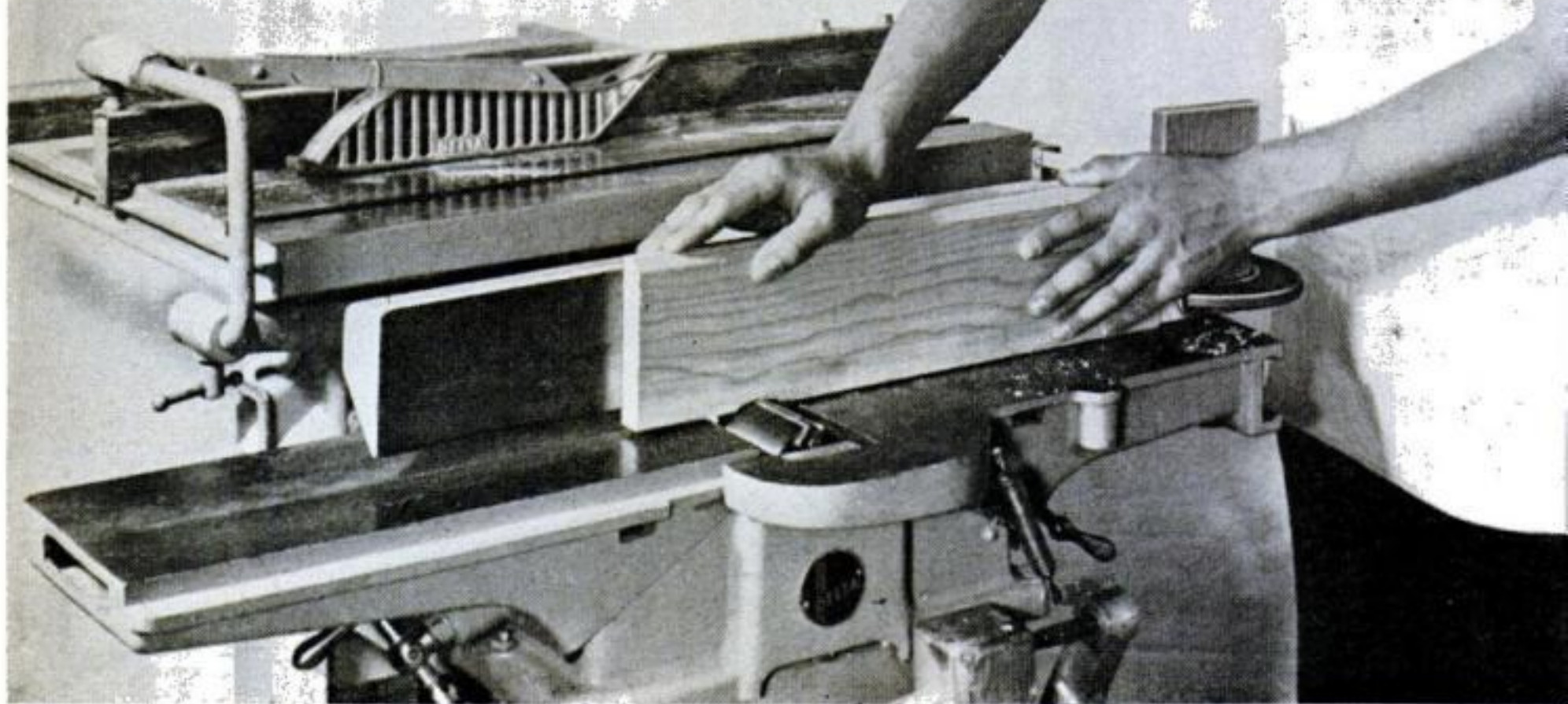
### Powder-Puff Cases Hold Parts

THOSE clear plastic containers in which powder puffs and other cosmetic supplies are sold will come in handy around your workbench. Used as containers for small screws, nuts, rivets, brads, and tacks, they are convenient because you can identify contents at a quick glance. They won't break if dropped.—Benjamin Nielsen, Aurora, Neb.





# 3224 Power Tools Lighten Edges Uniformly



**How to use your home-workshop machines to touch up and ornament work with recesses, chamfers, and bevels.**

**By Edwin M. Love**

**B**EVELS and chamfers are meant to attract the eye—and they do. Look at any piece of furniture and note how your glance just naturally focuses on an edge that is out of square. But if the edges aren't uniform, the flatteringly light effect that chamfers can give will be more than offset. The first cut is a challenge; all others on the same piece must match it.

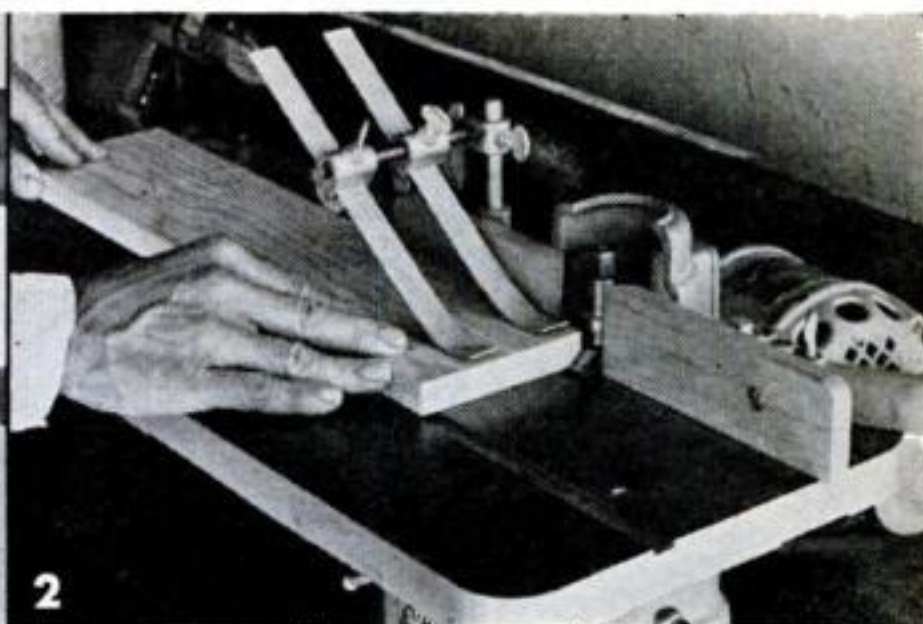
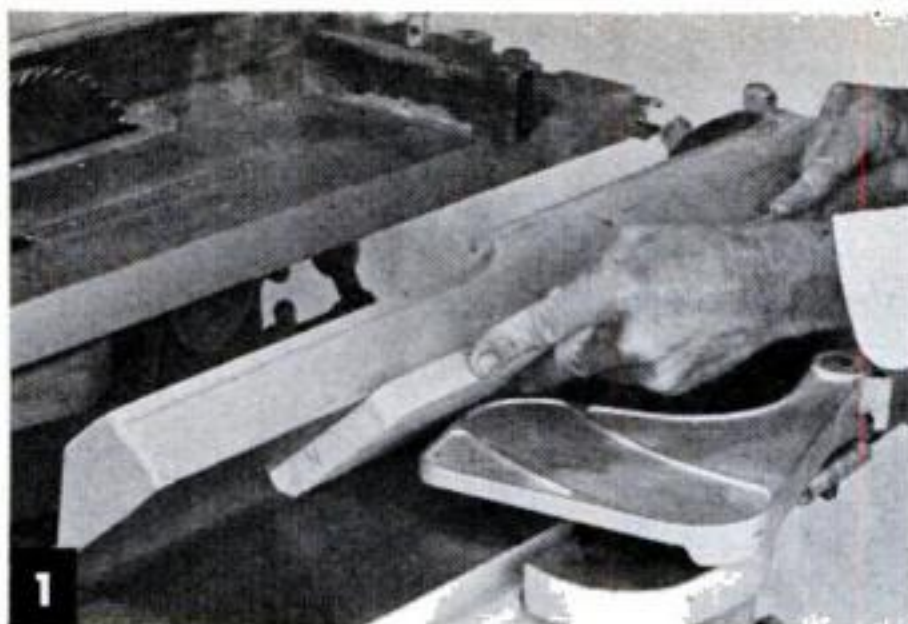
With power tools they do so almost automatically. Very often you don't even have to measure the angle of a cut so long as you keep the table setting the same for all steps. One pass over the cutter and the job is done exactly as you want it.

If you have a jointer, put it to work. Most chamfers and bevels are made with a 45-deg. setting, at which the depth of cut equals half its width. At times you may

find it convenient to tilt the jointer fence to the left as shown in Fig. 1, since this may permit cutting with the grain where the other setting would compel a cut against it. For an accurate stopped chamfer, clamp a block to the fence at the proper point. A kickback block at the operator's end will provide for a stopped chamfer at both ends.

The shaper is an even more convenient tool for chamfering. Lying flat on the table, the board does not have to be supported against a slanting fence. Fig. 2 illustrates a setup for chamfering on the underside of a board. A V-cutter is used, but the blades are almost hidden by the work and the fingers are well guarded. Align the two faces of the fence and clamp them in such a position that the points of the cutter project a little more than the depth of the chamfer. Adjust the upper edges of the cutter to height, and make a test cut on scrap. Cut the chamfer by feeding the work against rotation and pressing the board into the fence. Kickback and stop blocks serve the same purpose here as on the jointer.



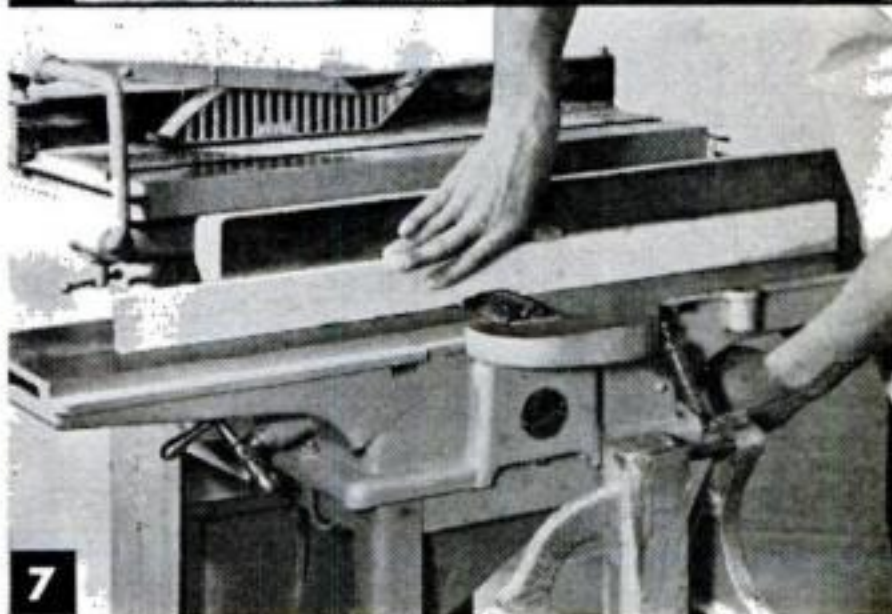
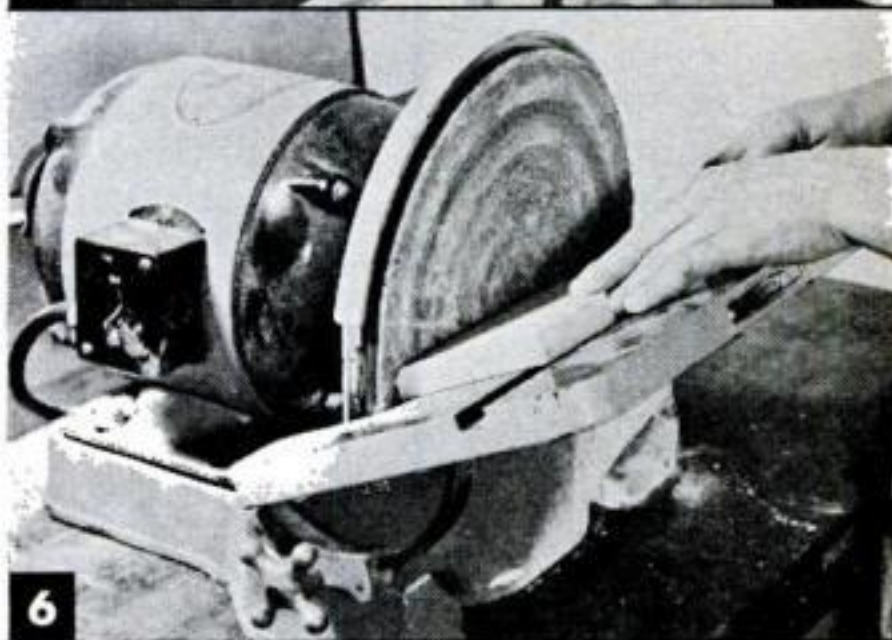
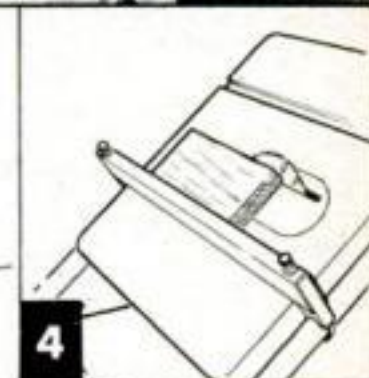
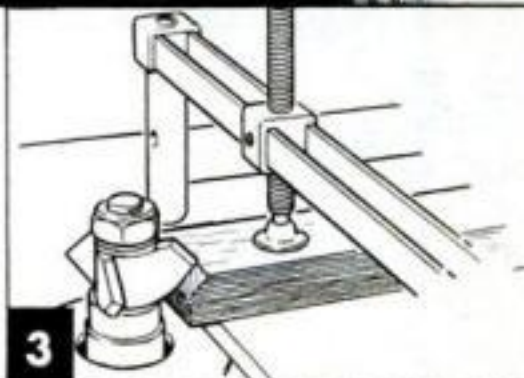


Occasionally it is necessary to chamfer the upper edge of a board with the lower half of the cutter in action (Fig. 3). Since the work passes between the table and the cutter, it follows that the chamfer will be even only if the board is of uniform thickness. The exposed cutter is also more dangerous, so use hold-downs and push sticks wherever possible.

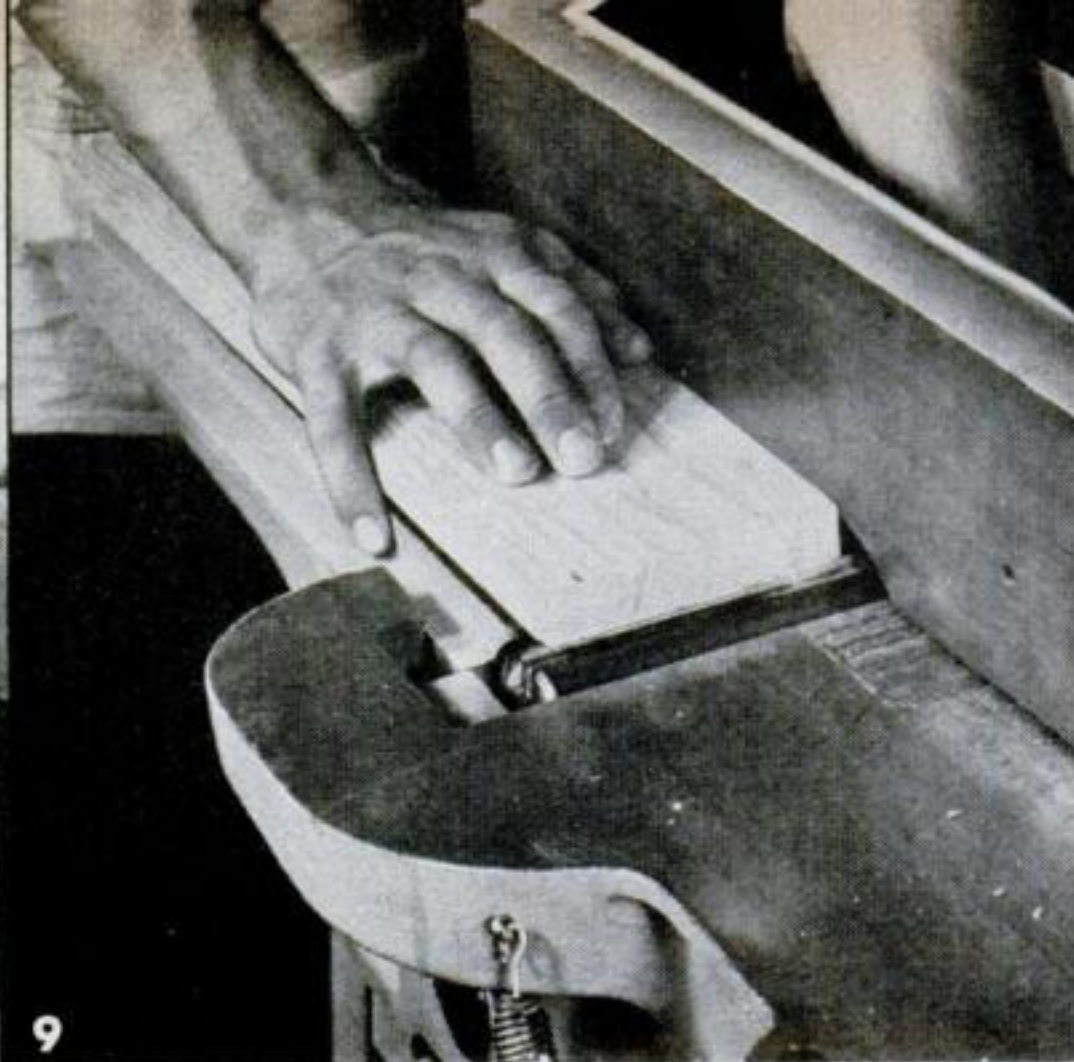
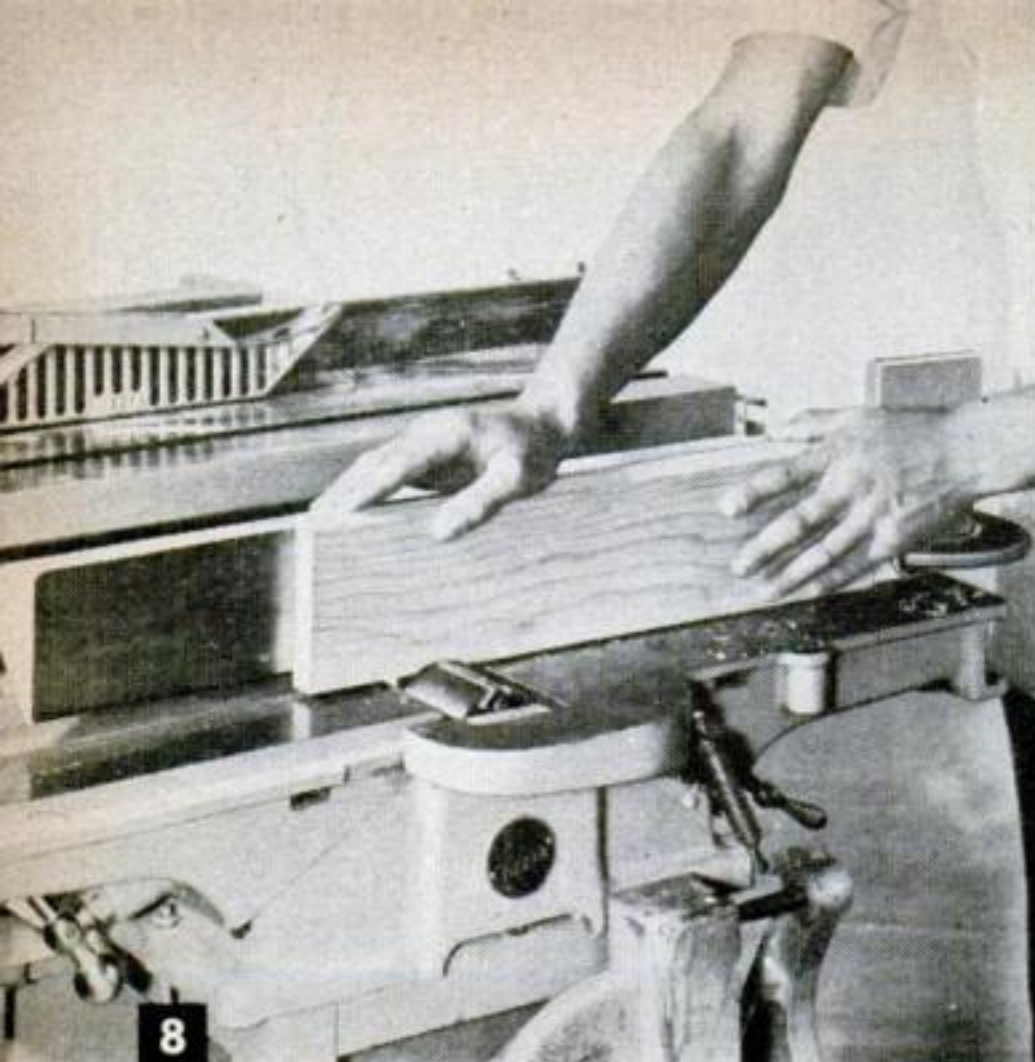
Jointers, shapers, and other special-purpose tools are fine if you happen to have them, but even a modest circular saw can cut a chamfer with the best of them. Tilt the table as shown in Fig. 4, clamp a fence to the table, and slide the work between it and the blade. Whenever possible keep the work below the blade so that gravity helps hold it against the fence. The saw has a definite advantage when the edge is uneven to start with or there is a considerable amount of stock to be removed.

Other common tools that will do a good chamfering job are the drill press—in which the setup is essentially the same as that for a shaper—and the disk sander. The latter, used as in Fig. 6, is the slowest and is not recommended for deep cuts. It is fine, however, for touching up bevels or chamfers made with other tools. Slide the work lengthwise across the table and keep it in constant motion.

Beveling, as pointed out last month, removes an entire edge while chamfering takes away only part of it. However much they differ in function and appearance, the techniques employed to produce them are much the same. With slight resetting, most of the chamfering operations described above will also produce a bevel. The jointer fence is usually set to the right (Fig. 5). On a shaper a V-cutter can bevel only relatively thin stock. For thicker boards replace the V-cutter with a straight-blade unit, clamp a strip of wood on the table parallel







with the fence, prop the work on this strip, and feed it into the cutters. The angle of the bevel is controlled by the thickness of the strip and its distance from the fence.

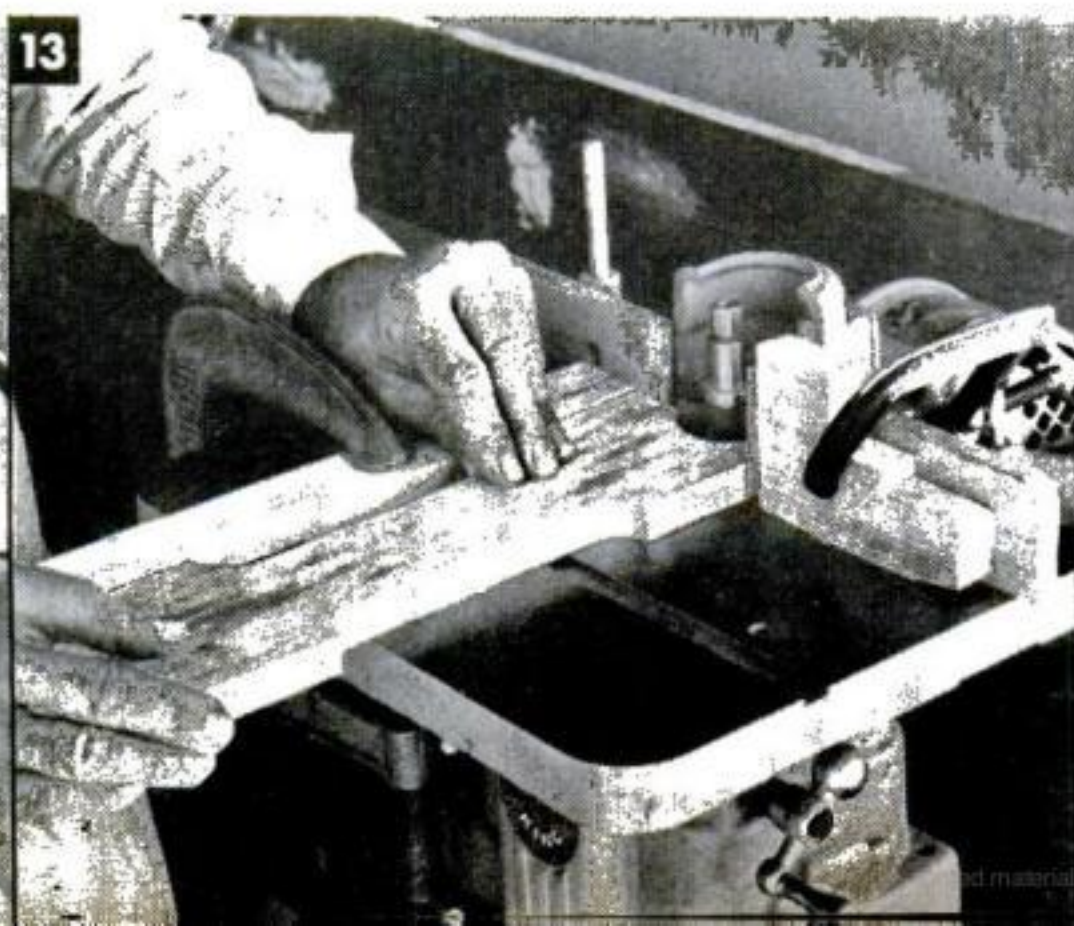
A circular saw is probably the best tool to use when a wide board is to be ripped into narrower beveled strips, since one cut yields two bevels. If you have a jointer to smooth the cuts with, the usual combination blade will suffice. Alternatively a hollow-ground miter saw will cut a bevel so smooth that only a touch of sandpaper will be needed to finish the job. Use the miter gauge when cutting an end bevel on a saw.

Like the marines, a jigsaw will rush to the rescue when you have no other beveling tool. In fact, it's pretty good for inside cuts. A bandsaw is still better. While still not the perfect choice, if used with a wide blade it will make a comparatively straight cut. If the table is grooved for a miter gauge and equipped with a ripping fence, use these accessories.

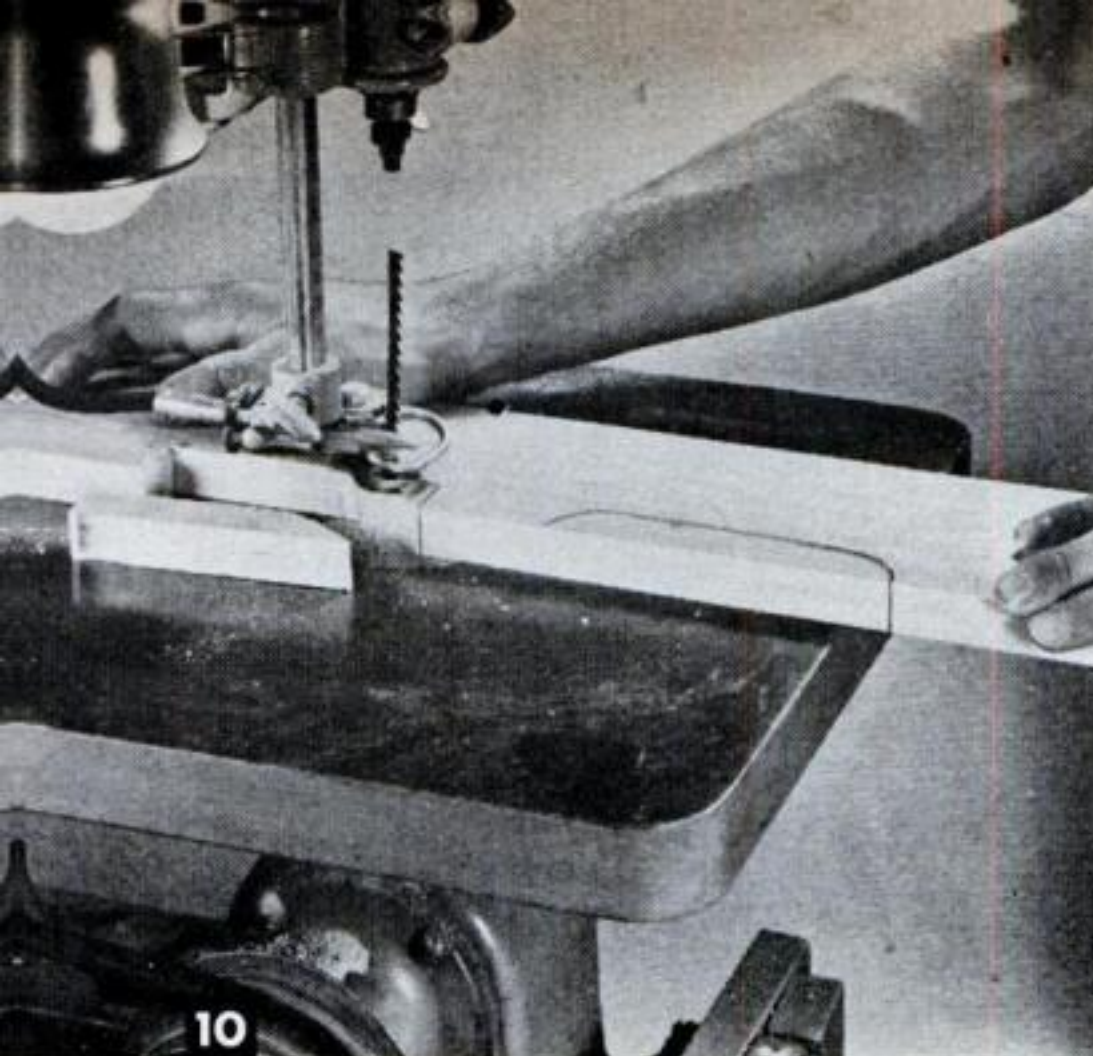
For recessing, the order of usefulness of these tools is somewhat different. A jointer will do very nicely, but only if the indentation to be made is less than  $\frac{1}{2}$ " or so. The tables must first be brought to equal height, since only the center portion is to be cut away. Set the infeed table by the scale and level the outfeed table by bridging the cutter head with a notched straightedge as shown in Fig. 7.

The deep cut of the knives gives the work a sharp thrust, so clamp a kickback block to the near edge of the fence as an aid in starting the work into the cutters (Fig. 8). Once started, you will find it easy to push the work along.

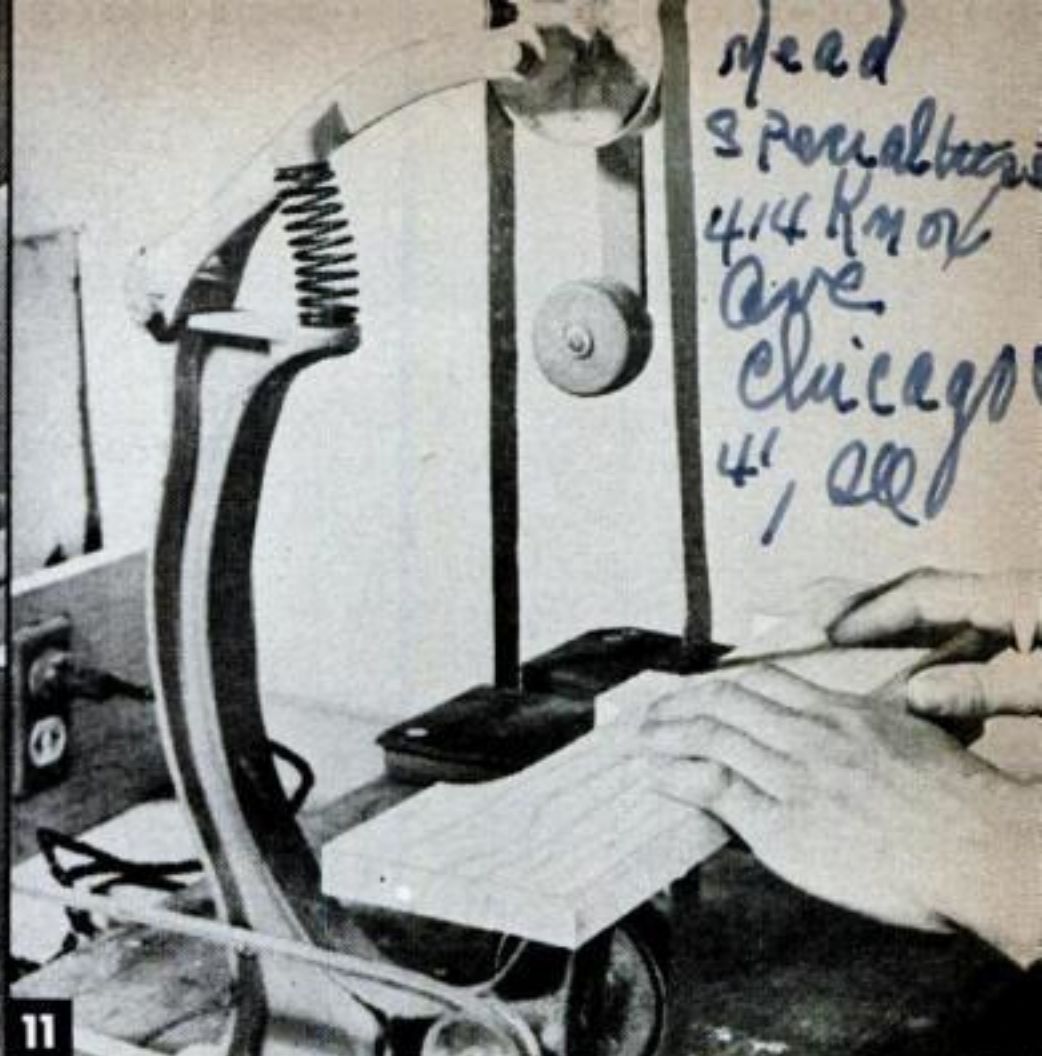
After recessing, return the infeed table to its normal level. Next, joint a board far enough to project over the outfeed table, and then raise the latter to touch the board. For a further check, rest a board flat on the outfeed table so that the end projects over the cutter head as in Fig. 9. Turn the head







10



11

Head  
3' 2" x 1/2" x 1/2"  
4/4 KNOX  
Ave  
Chicago  
4', 20'

by hand; if the table is at the proper level you will hear a faint scraping sound but there will be no lift on the board.

When the ends of a jointed recess are to be squared, trim them with a bandsaw, jigsaw, or handsaw. A touch of sandpaper completes the job.

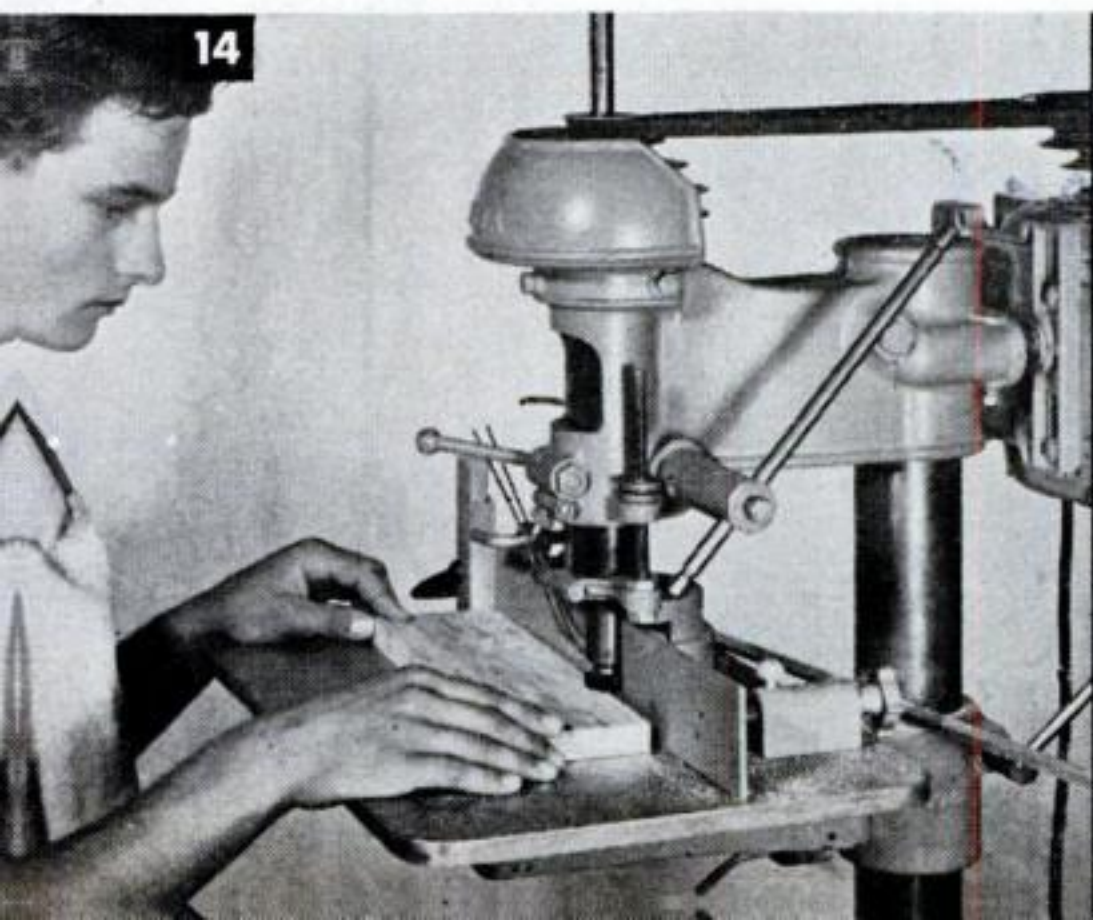
Short and deep recesses are readily cut on a jigsaw. If the ends are coves, you can either follow the line in at one end and out the other or cut in from both ends toward the center. For square ends, cut straight in; then swing the saw in from one end and rip to the other. Finish by ripping from the other end as shown in Fig. 10. Follow the same procedure for recessing with a bandsaw.

A sawed recess usually requires smoothing. This job is quickly done with a 1" abrasive belt used in place of the regular blade on a bandsaw or on a special sanding machine (Fig. 11). A flat backing guide used behind the belt prevents rounding of

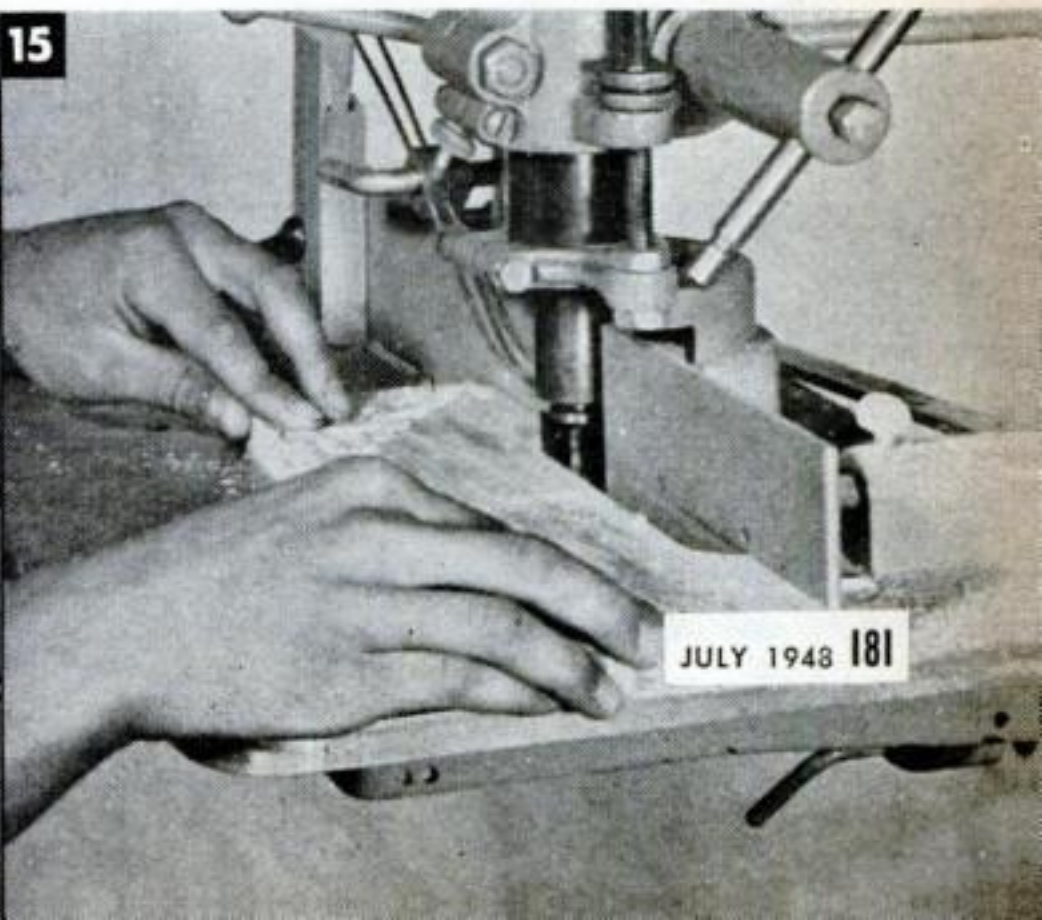
a sanded edge. If the cut has been made with reasonable care, hand sanding will also give a clean surface quickly.

A shaper can manage a deeper recess than a jointer. Mount a straight-edge cutter on the spindle. Set the fence sections in line and back far enough to give the necessary depth (Fig. 12). Deep cuts are better made with two or more passes. To recess the end of a medium width board, feed the work against the cutter, pushing the edge in along a wooden strip clamped to the table (Fig. 13). From this starting point push the piece across the table until the stop block is reached.

Fig. 14 illustrates the start of a recess on a drill press. Although the cutter is driven from above rather than from below, the operation is the same as on a shaper. Note the kickback block clamped to the far edge of the table. A stop block may be used at the forward end or the cut can be stopped at a pencil mark as in Fig. 15. END



14



15

JULY 1948 181



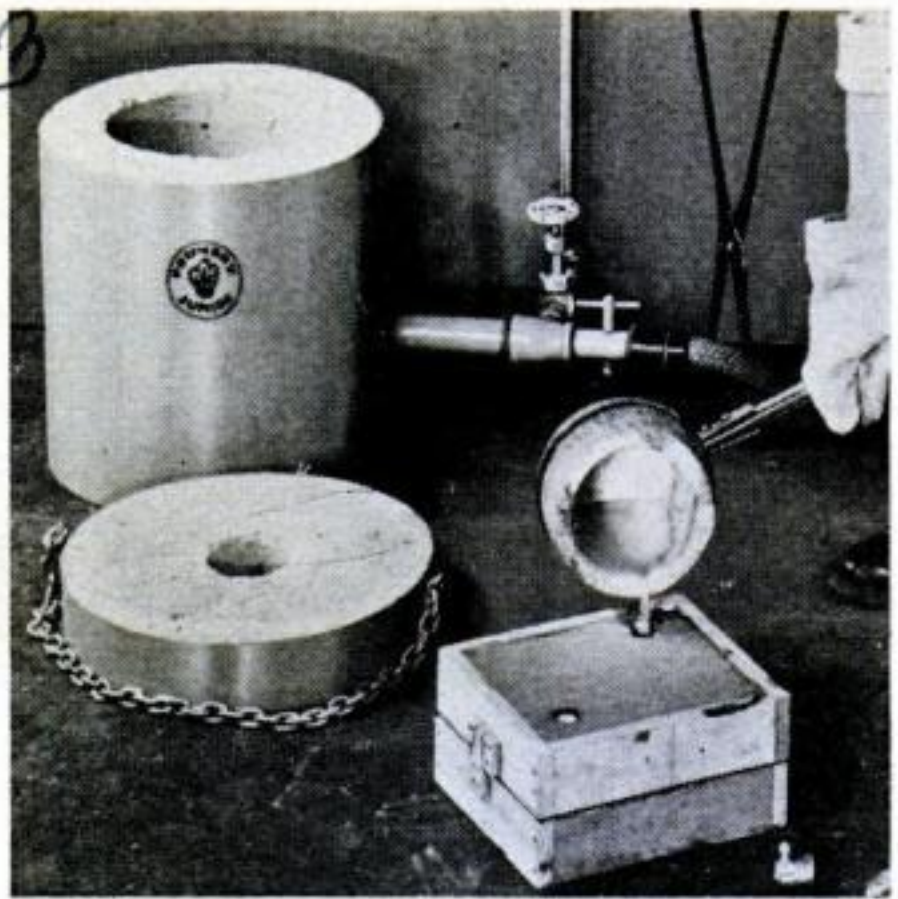


## NEW TOOLS

5093

**Foundry for Home Casting.** An inexpensive furnace, complete with all equipment necessary for producing nonferrous castings, has been announced by the Sawyer Bailey Corp., of Buffalo, N. Y. Designed to burn cooking gas at the normal pressures supplied to the home, the furnace will withstand temperatures up to 2400 deg. F. Air may be supplied by a motor-driven blower or a household vacuum cleaner.

The furnace will take crucibles that have a working capacity of 10 lb. of aluminum or 34 lb. of brass or bronze. Sawyer Bailey supplies various casting alloys.



**Push Drill Gets New Look.** Made with a red plastic barrel, this new push drill is a product of the Miller Falls Co., of Greenfield, Mass. Molded in the handle are eight compartments to take drills from 1/16"

to 11/64". These are supplied with the tool. An index ring at the top enables the user to choose the desired drill and remove it quickly from the container. Four steel jaws secure the fluted-shank drills.



**Polish with Your Drill.** An electric-drill attachment offered by the D. S. Bertram Engineering Co., Kansas City, Mo., may be used for polishing, buffing, and sanding. The bearings and gears operate in an oil bath in the aluminum housing. Selling for about \$10, the set includes a 5" rubber disk, two sanding disks, and a polishing pad.

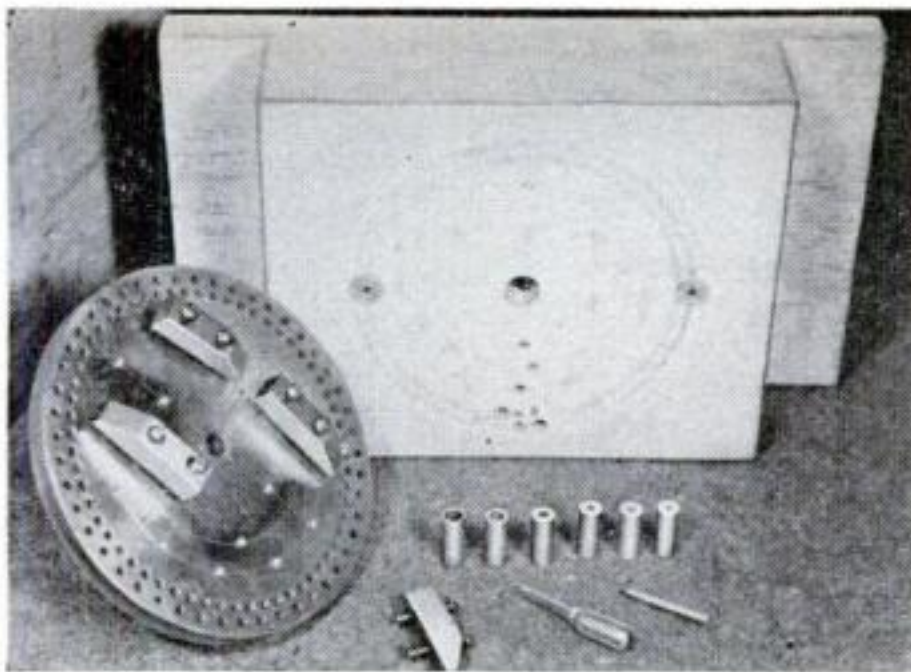
### Gear Gauge.

Here's a paper weight that also serves as a gear gauge. Made of stainless steel, the gauge set consists of 12 leaves. These include 24 different gear shapes of various pitch. A quick fitting of the gauge to a gear will quickly show the correct pitch—eliminating the necessity of counting the teeth and computing the pitch. Machined with the aid of special fixtures, the gauge teeth are of the correct involute shape. The George Scherr Co., of New York, developed it.

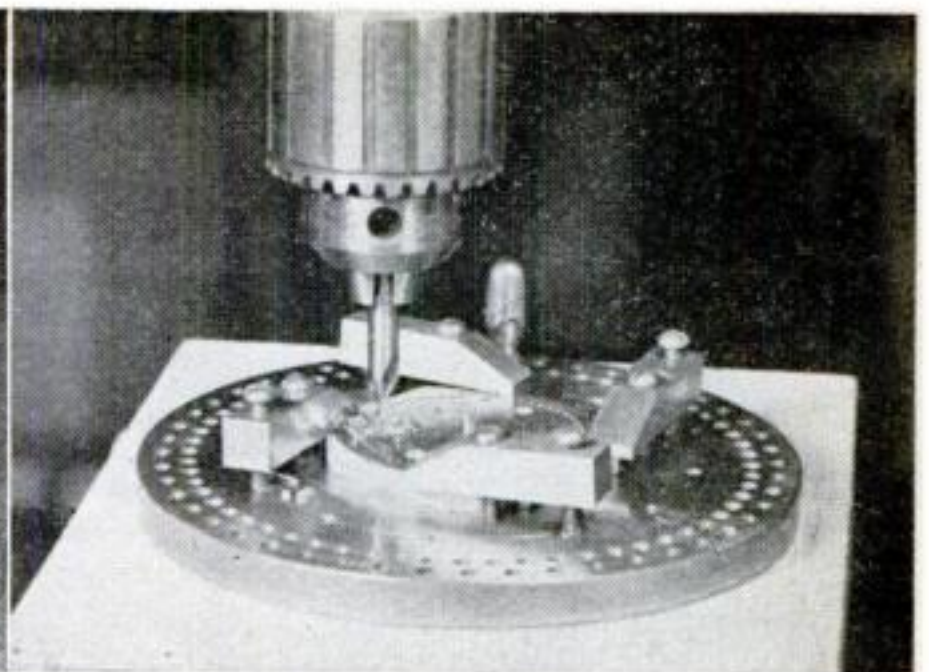


**Level Built into Ruler.** An inexpensive hardwood rule with horizontal and perpendicular levels is distributed by the Alexander-Wilson Co., of Los Angeles. Marked in 1/16" graduations, the rule is 3/8" thick, 1 3/8" wide, and 18" long. Although designed for the handy man, the combination tool may prove useful to electricians and others as well. It sells for about \$1.





Below the base, left to right, are the indexing plate, clamps, centering bushings, and index pin.



Spot holes for small-size drills with a center-drill first. Note index pin at back of plate.

2015

## Indexing Head for Your Drill Press

**M**OUNT this gadget on the drill press, and you can not only lay out holes or angles, but spot-drill right on the nose. Small spoked wheels, gears, locomotive boiler heads, and the like can be made with realistic precision.

Cut a  $5\frac{1}{4}$ " circle of  $\frac{3}{8}$ " brass or steel, tap  $\frac{1}{2}$ "-20 at the center, and screw in a threaded stud. Run solder into the threads. In a lathe, turn to 5". Centerdrill  $\frac{5}{16}$ " by  $\frac{3}{4}$ ".

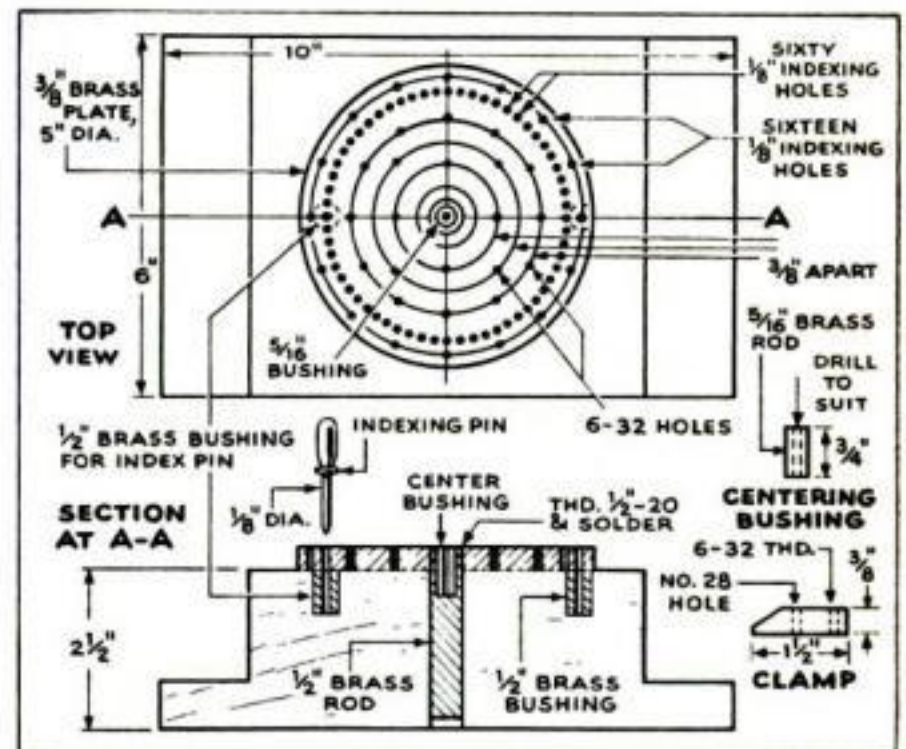
Scribe the five circles. Then, using the lathe index or a suitable gear mounted behind the plate, mark off the holes with a surface gauge set on the compound rest. (The number in the drawing should do, but more were drilled in the plate shown.)

Drill the wooden base a close fit for the  $\frac{1}{2}$ " stud. Clamp the base on the drill press with an indexing circle aligned under a  $\frac{1}{8}$ " drill. Rotate the plate to drill the holes. Tap clamping holes 6-32 and remove burrs.

Press a bushing into the base under each indexing circle. Drill through one hole in each circle into the bushing. Make up the pin,  $\frac{5}{16}$ " o.d. centering bushings drilled

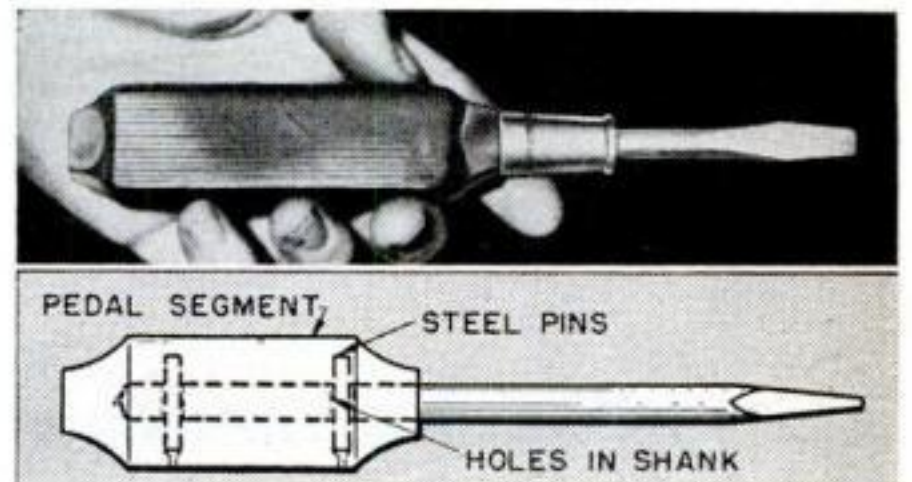
for various work sizes, and four clamp jaws.

Place the proper bushing on a pin or shaft that fits the center hole in the work, and clamp the latter on the plate. Turn the disk the required number of holes for each division (for example: 12 in the inner circle for five divisions; two in the outer circle for eight).—Herbert R. Pfister, Bronx, N. Y.



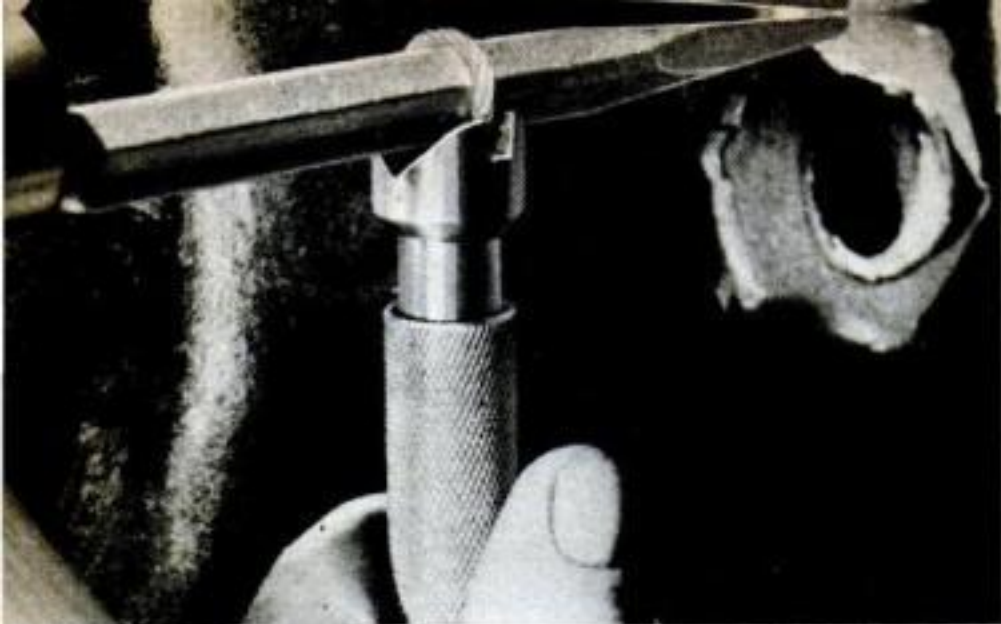
## Part of Bike Pedal Forms Screwdriver Handle

**I**NSTEAD of discarding screwdrivers with broken handles, you can give them a new grip with rubber from an old bike pedal. Force a pedal tread over the shank and drill two holes through both the rubber and shank. Fit steel pins into the holes to prevent the handle from turning. The pins should be short enough to permit the rubber to close over them, insuring a shockproof handle.—D. G. Pittwood, Moscow, Idaho.

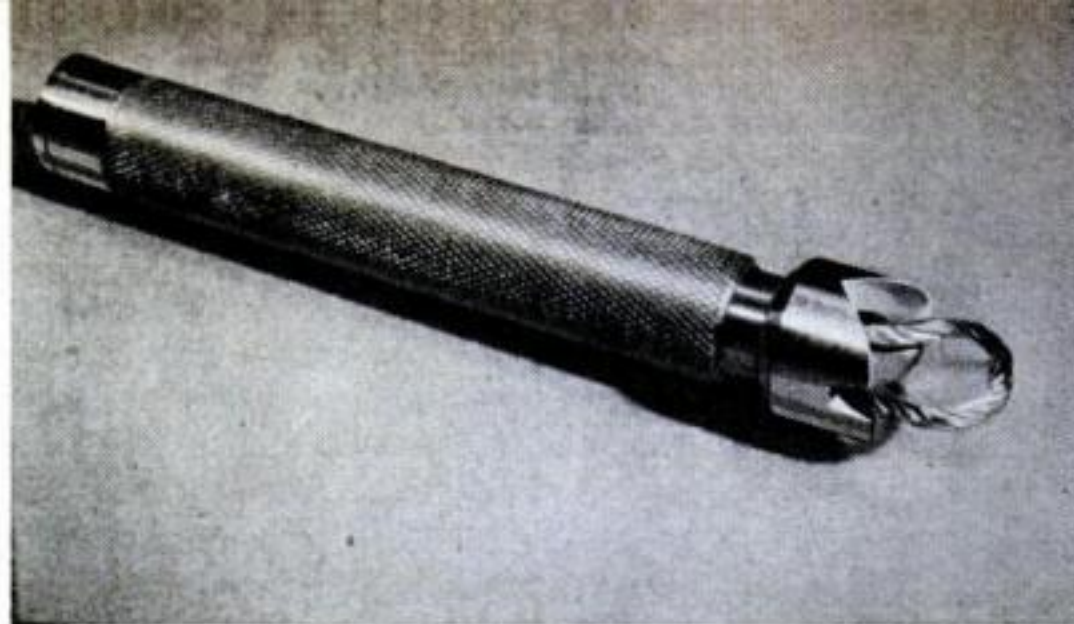


5124





This useful tool keeps fingers out of the way and will hold chisels in difficult-to-reach spots.



The holder solidly grips chisels and punches from  $\frac{3}{8}$ " up to 1". It is all made of scrap steel.

152

## Chisel Holder Spares Your Knuckles

WITH this holder you can hit a chisel without worrying about your fingers. To make it, you need scrap steel and a foot of small wire rope such as  $\frac{1}{8}$ " airplane cable.

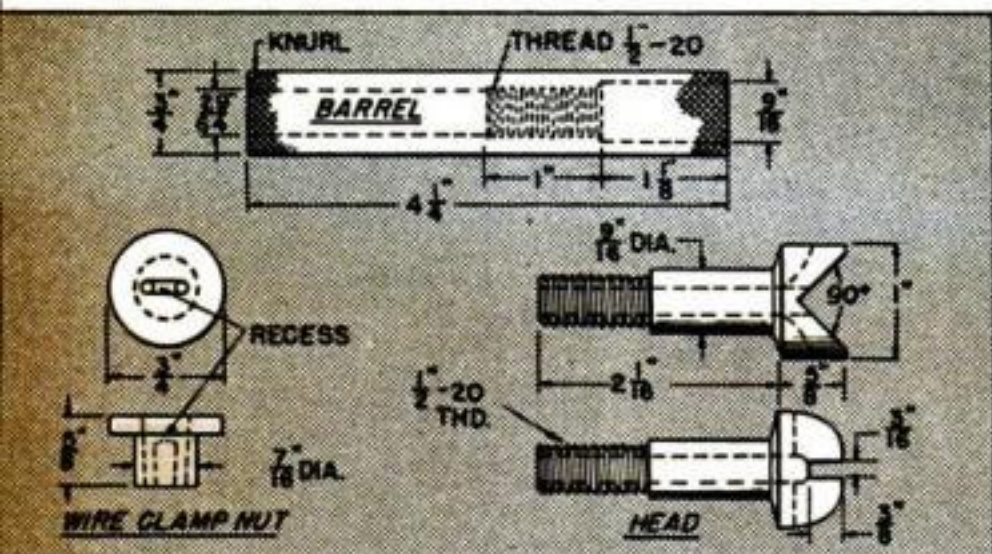
Turn and knurl the barrel. Then drill and bore it and face both ends. Cut the thread with a hand tap. Turn the head to size, drill through, and make the V-cut in the milling attachment, if you have one. Use a keyway cutter for the slots. Both the V-notch and the slots may be filed.

Turn the wire-clamp nut to shape, cut it off, and face it. Drill two holes, just large enough to take the wire, through the clamp at a slight angle. Chisel or rout a  $\frac{1}{4}$ " deep

recess between the holes as indicated in the drawing.

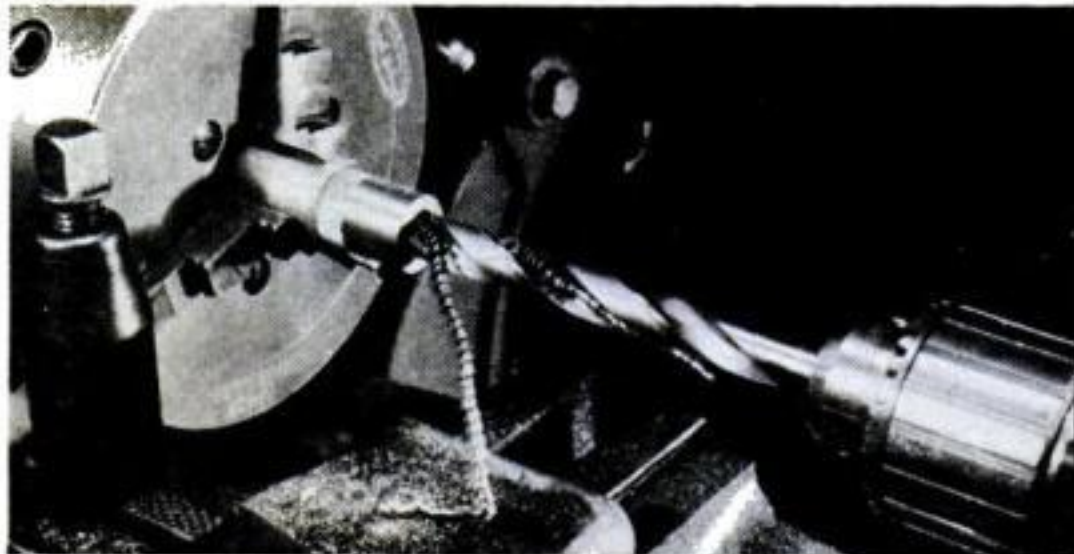
The wire is held in the clamp by driving a wedge of soft metal into the slot between the holes. When you want to replace the wire, drill it and the wedge out of the slot.

Before anchoring the wire, assemble the tool. Make sure all parts work freely. Then screw the barrel and head tightly together. Place the wire around the largest chisel to be used and mark the wire. Disassemble the tool and anchor the wire as marked in the clamp nut. Reassemble it and your cold-chisel holder is ready for use.—Will Thomas, Kenmore, N. Y.



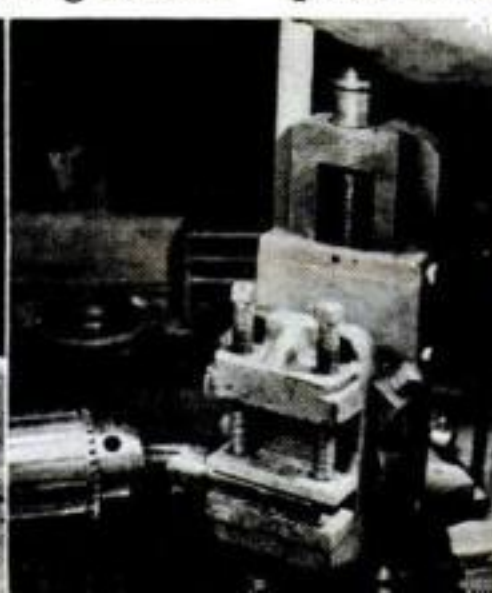
Slots in the head must be big enough to carry the wire around chisel shanks without binding.

Bore the head end of the barrel (left below) to the depth shown in the diagram. The notch in the head may be cut with a milling attach-



While drilling through barrel in the three-jaw chuck, protect the knurl with soft sheet metal.

ment or even a file. A piece of small wire rope and three machined parts (at right below) comprise the tool. Metal wedge holds wire in clamp.



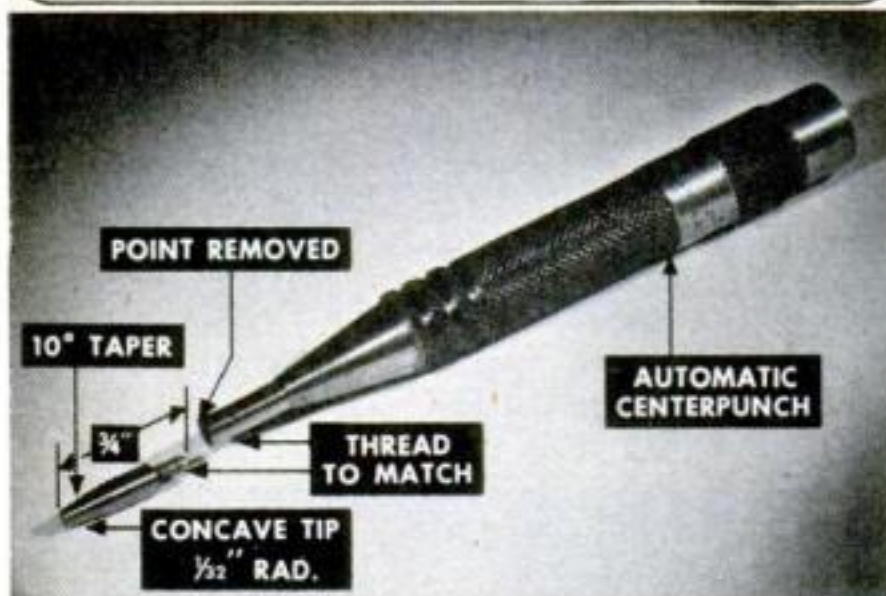








## NEW SHOP IDEAS



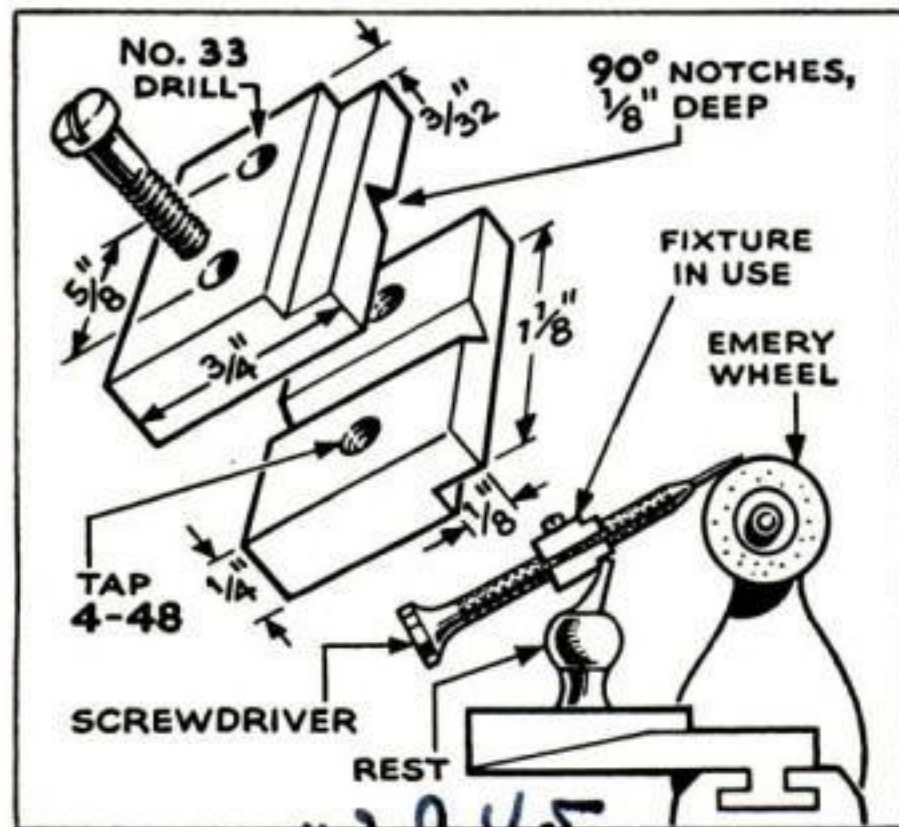
**Punch Becomes Riveter.** An ordinary automatic centerpunch—the kind that delivers a spring-actuated blow when the handle is depressed—makes a good riveter for use on models, instruments, and other fine work. Several strokes of the handle will mushroom an excellent head, for example, on a No. 18 escutcheon pin.

Turn a replacement point from 3/16" drill rod, making it about 3/4" long. Form a

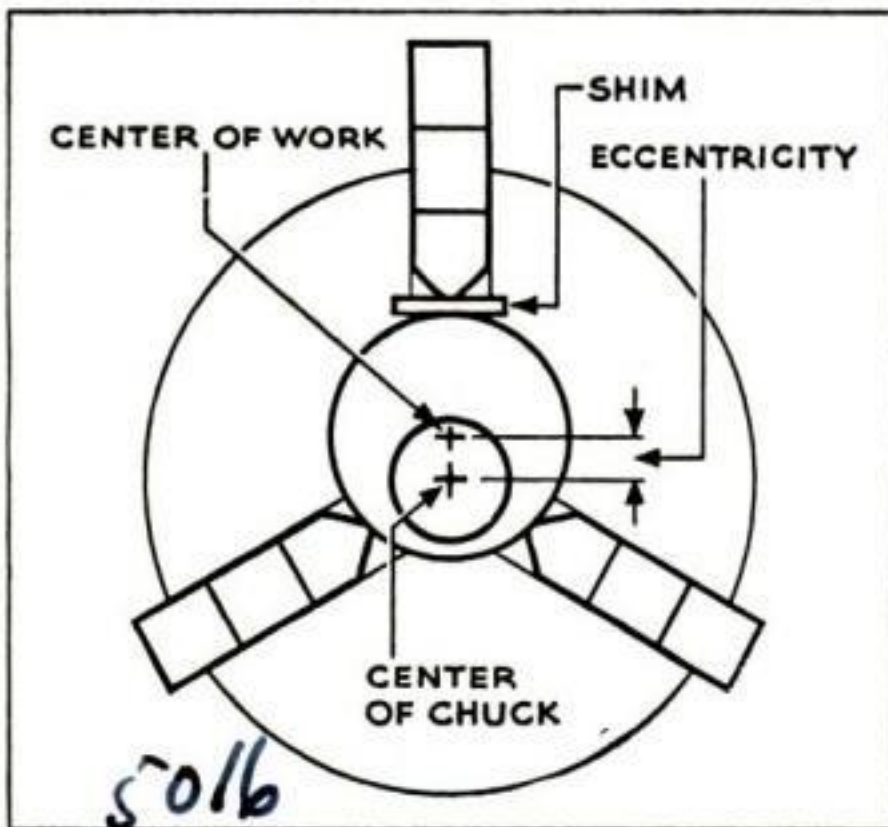


little concave depression at the end of the tip, 1/16" or less in diameter, using a round-nose bit. Thread the other end to fit your centerpunch (3-48 for the one shown).

Harden the tip by heating it cherry red and quenching it in salt water, polish it bright, and temper by holding it cautiously in a flame until it begins to turn a light brown. Then re-quench it instantly in motor oil.—Herbert R. Pfister, Bronx, N. Y.

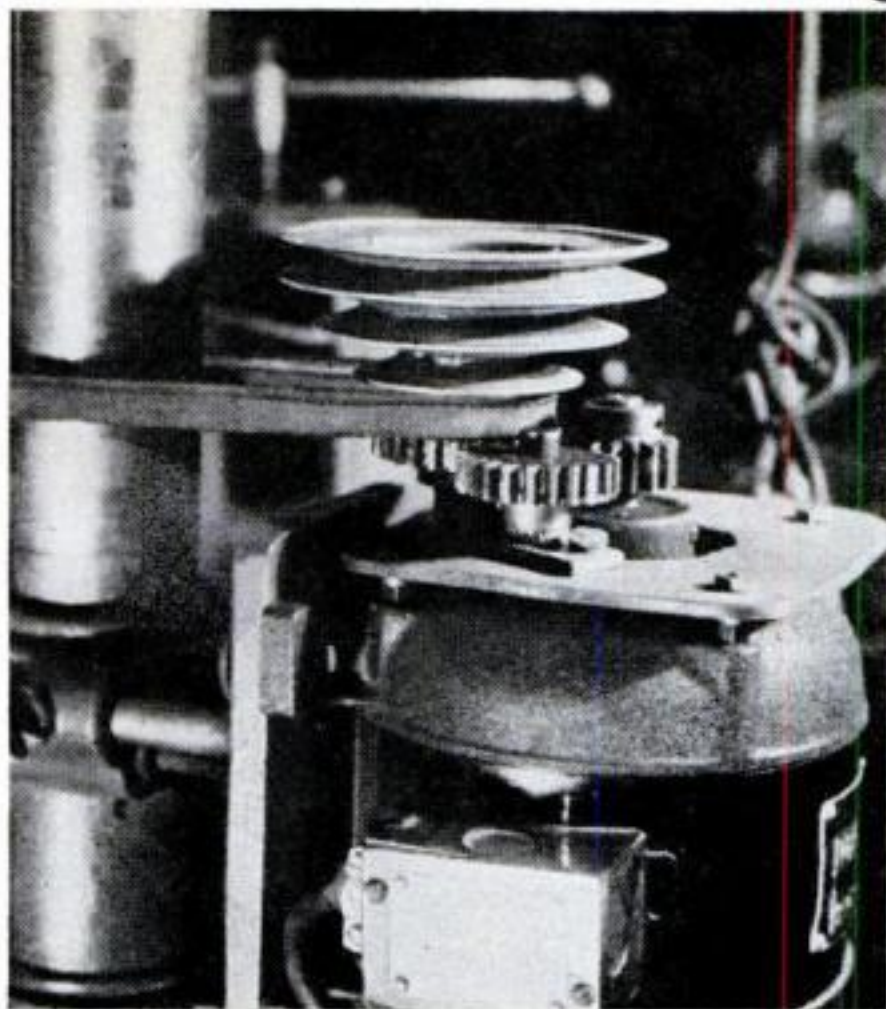


**Fixture for Sharpening Screwdrivers.** Grinding just the right shape on jeweler's screwdrivers is hard to do free-hand, but it's a cinch with this little fixture. Make it of brass or dural. I use mine against the T-rest of a watchmaker's lathe in which a 1 1/4" emery wheel is mounted, but it can be adapted to any grinder. Set the fixture and rest so that you grind a trifle back from the bit edge, turn over the fixture and grind equally, and stone the end to thickness.—C. M. Chambers, Hampton, Va.



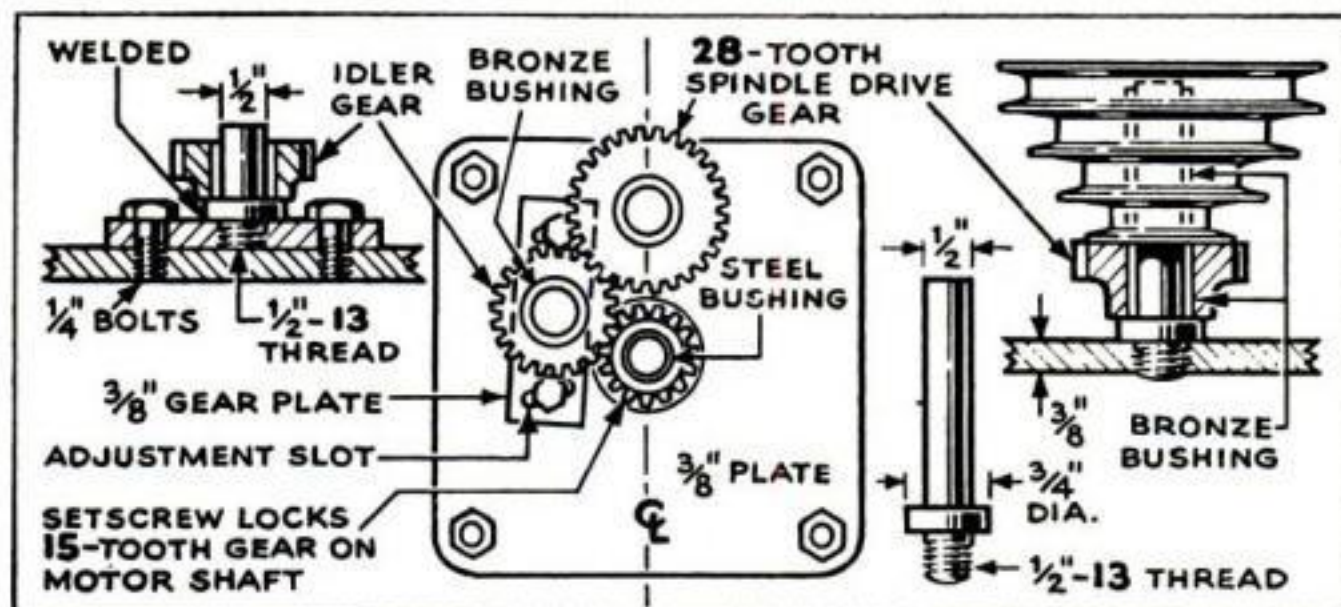
**Turning Eccentrics in Three-Jaw.** One of the quickest ways of chucking work off center in the lathe for eccentric turning is to remove the No. 3 jaw of the chuck. Then turn the jaw-actuating scroll thread in the chuck the proper number of turns to secure the offset you wish, and replace the jaw. Since this will rarely ever give the exact amount of eccentricity desired, engage the jaw at the nearest over-size point and use a shim for the exact setting.—Federico Strasser, Santiago, Chile.





**Drill Press Is Geared.** Since I sometimes need a drill press that will produce holes up to 1" in diameter, I made this speed-reducing gear train for my  $\frac{1}{2}$ " press. The rig in no way interferes with its regular use. With the gears shown (from a midget-car transmission) I get a spindle speed of about 215 r.p.m., fine for milling as well as heavy drilling.

The gears are mounted on a  $\frac{3}{8}$ " steel plate,

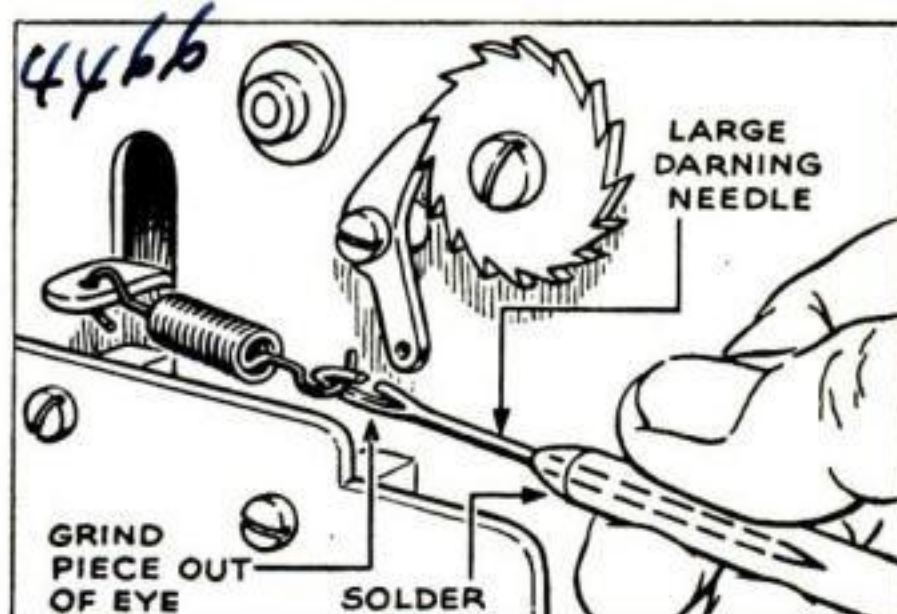


held by extra long motor bolts and spacers. A central hole clears the motor shaft, on which is mounted a gear bushed down to  $\frac{1}{2}$ ". Meshed with this is an idler running in a bronze bushing on a short steel stud that's threaded and welded to a small plate. Hold-down bolts running through slots secure this plate to the main one and permit adjustment to suit different gears.

The final gear runs on a steel stud di-

rectly in line with the motor shaft and drill spindle. A four-step pulley was bored out to a press fit on a long bronze bushing that is likewise press-fitted to the gear. Some  $\frac{3}{16}$ " steel pins are also driven diagonally from pulley flange into gear.—Carl K. Jean, Parker, Ind.

**Needle Unhooks Springs.** This little gadget is very useful when you're working on typewriters and other crowded mechanisms. Trying to unhook (or worse, to hook) small tension springs by hand or with long-nose pliers is often exasperating. The tool at right, which makes the job easy, is merely a darning needle soldered in a tubing handle. One side of the eye is nicked open on a grinder. If you prefer, the needle can also be held by a setscrew meeting a hole in a rod.—Andrew Vena, Philadelphia.





# Shoot Late for Striking Photos



**Moonlight shots** are one effect you can create in late afternoon. This photo of a Cape Cod fisherman returning to port at 6:30 p.m. was

made on Super Panchro Press  $\text{\textcircled{T}}$  Type B film with a Wratten G (orange) filter,  $1/200$  sec. at  $f/8$ . Haze prevented flare in the lens.

**Outdoor portraits** in the late afternoon gain brilliance and depth. These Japanese children were photographed at 5:30 p.m. in October on Super XX  $\text{\textcircled{T}}$  film pack,  $1/200$  at  $f/6:3$ .

**Lighthouses** come to life only at night. It is therefore appropriate to give them a nocturnal setting. This one was shot at 4 p.m. with a Wratten G. The print was slightly diffused.







**Shadows add texture** and crispness to this view of a Japanese spreading rice on straw mats to dry. If you want texture, always shoot in the

late afternoon. Each object, however small, will stand out against the sharp shadow that it casts. In this case the time was 4 p.m.

**Don't fold up your camera when the sun dips toward the horizon. Late afternoon gives many good photos.**

**By Robert F. Smith**

**A**S LONG as any daylight remains, it's never too late for successful outdoor photos. All too often shutters stop clicking when the sun reaches an angle of about 30 deg. Actually, that's a good time to be starting.

In the late afternoon the sun gives more warmth and texture to a photo than at any other time of the day. It also offers latitude in the treatment of a subject. A scene may be recorded realistically or not—depending on your whim of the moment. Proper choice of filter, for instance, produces a moonlight scene.

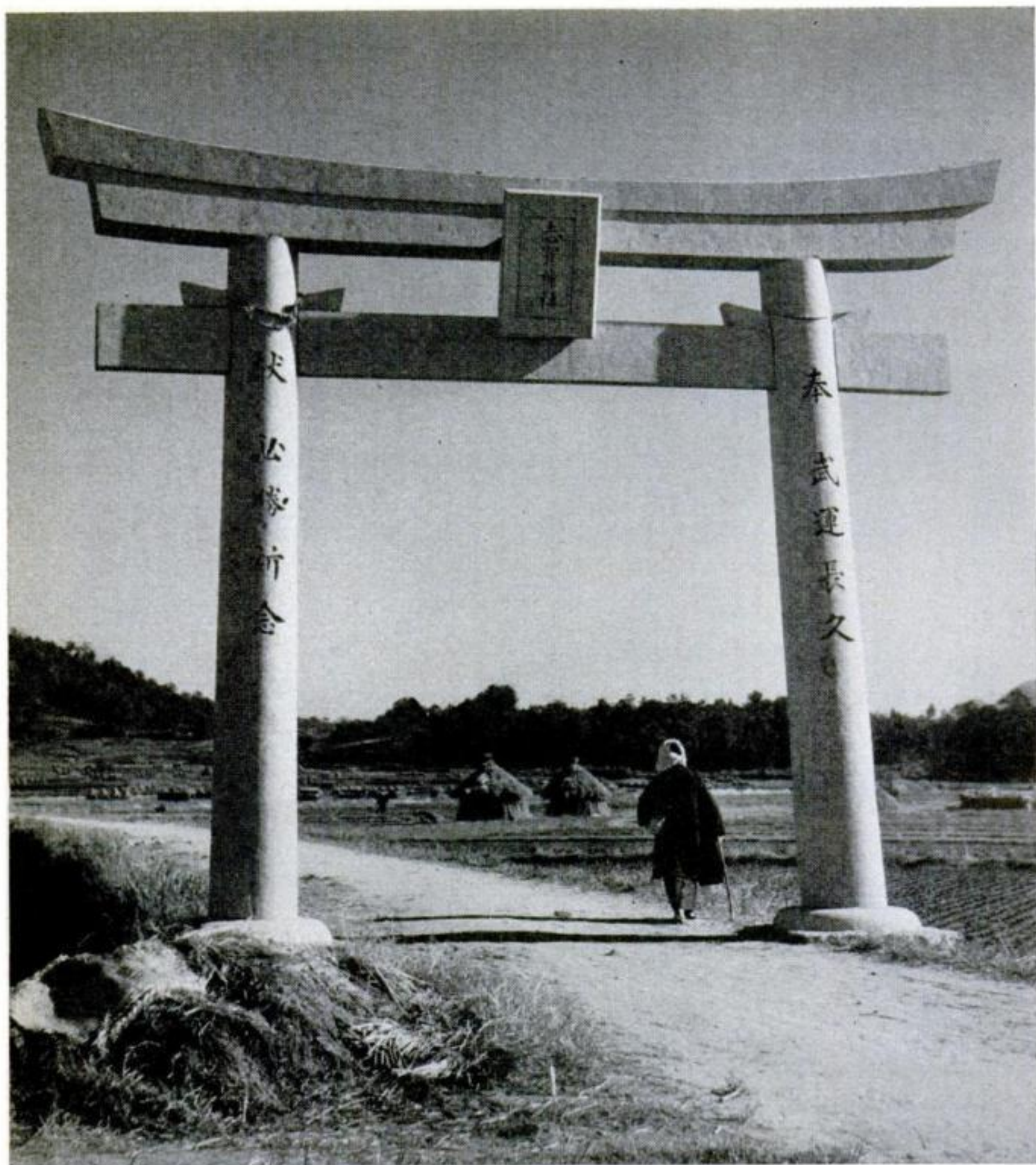
The adjoining photograph of the light-

house is an example of the latter. Like zombies, lighthouses don't come to life until after dark. They are the glowing sentinels of the mariner at night—and should be portrayed as such. Late afternoon light, combined with a Wratten G filter, gave the desired effect—a lonely light in the darkness.

Now let's consider a late shot handled straight—the photograph of the Japanese torii on the following page. Here all the texture and warm tones are faithfully recorded. This results from the oblique angle at which the light hit the subject. Every blade of grass casts a well-defined shadow, creating texture. To enhance the tonal quality, a K-2 (medium yellow) filter was used, allowing the warm tones to register and dropping out enough of the blue to intensify the shadows.

Outdoor portraits taken as the sun nears the horizon have a sparkle, brilliance, and depth that is next to impossible to duplicate









**Long shadows** at 4 p.m. bring out the detail in this typical Japanese scene. Good modeling and long scale are always advantages of shooting

in the final hours of the day. The exposure here was 1/200 at f/11 on Super XX with a K-2 filter. Notice the texture in the stone.

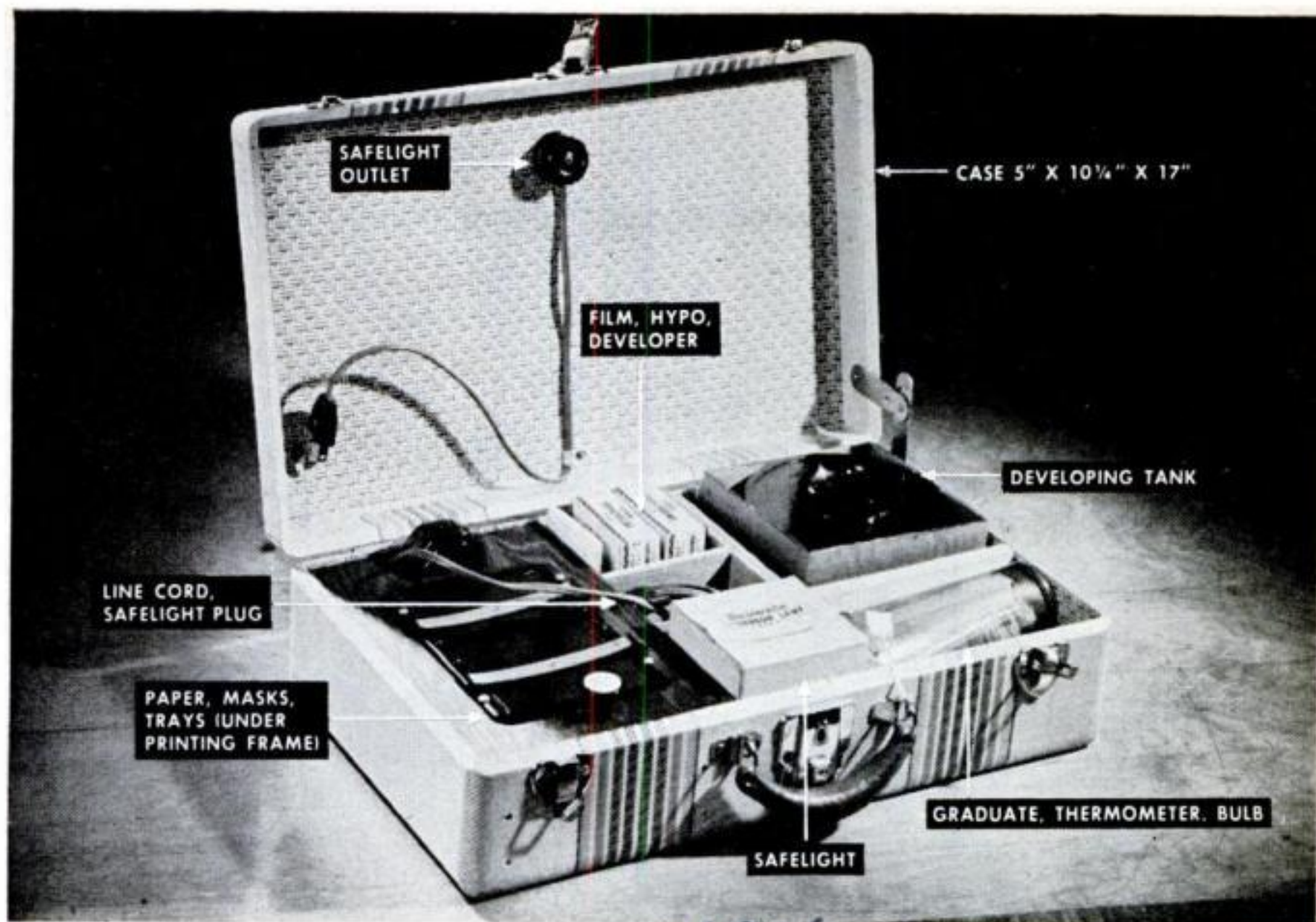
with any other light source—certainly with any equipment available to the ordinary amateur. In recent years the technique of synchro-sunlight—supplementing natural light with flash—has become very popular. At its very best, however, this does not compare with good late sunlight results.

Made at 5:30 of a clear October afternoon, the accompanying photo of the two Japanese children illustrates the roundness, modeling, and long scale achieved by this means. A late afternoon sun is rich in red

and yellow light. A K-2 filter allows this light to register and cuts out sufficient blue to darken the sky slightly.

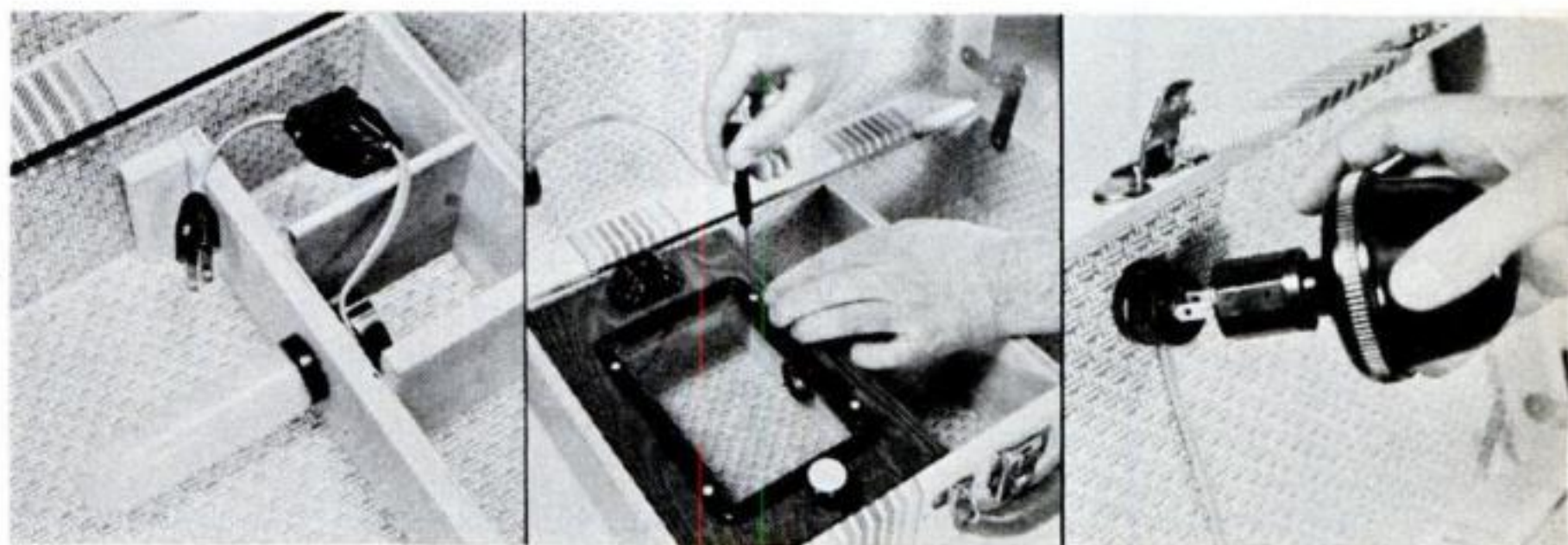
Choice of film and developer is important for late-light photography. An emulsion with fine grain, long scale, and moderate contrast is usually best. Typical good film and developer combinations are as follows: 35-mm. Panatomic X  and Edwal Super 20 ; 120 and 620 Plus X  and Microdol  or Edwal Super 20; and Super XX sheet and Microdol or D-76 developer. END





## Darkroom Fits the Case

5-194  
**W**OULD you like to see your vacation photos before returning home? This suitcase holds everything needed to develop roll film and make contact prints. Adjust the size of the compartments to suit your equipment. The partitions are  $\frac{1}{4}$ " plywood. A 115-volt line leads to an outlet receptacle on the printer. Safelight and printing light are plugged into this. A feed-through switch turns the printing light on and off.—Arthur C. Miller, Manhattan, N. Y.



A **contact printer** was built in. It consists of a  $3\frac{1}{4}$ " by  $5\frac{1}{2}$ " metal printing frame set in a sheet of plywood, with a 25-watt frosted bulb centered underneath. Drill the frame edges for

screws. For traveling, both the printing and safelight bulbs are taken from their sockets. Trays, paper, masks, stirring rod, film clips, and sponge fit into the printer compartment.





## PHOTO IDEAS AND EQUIPMENT



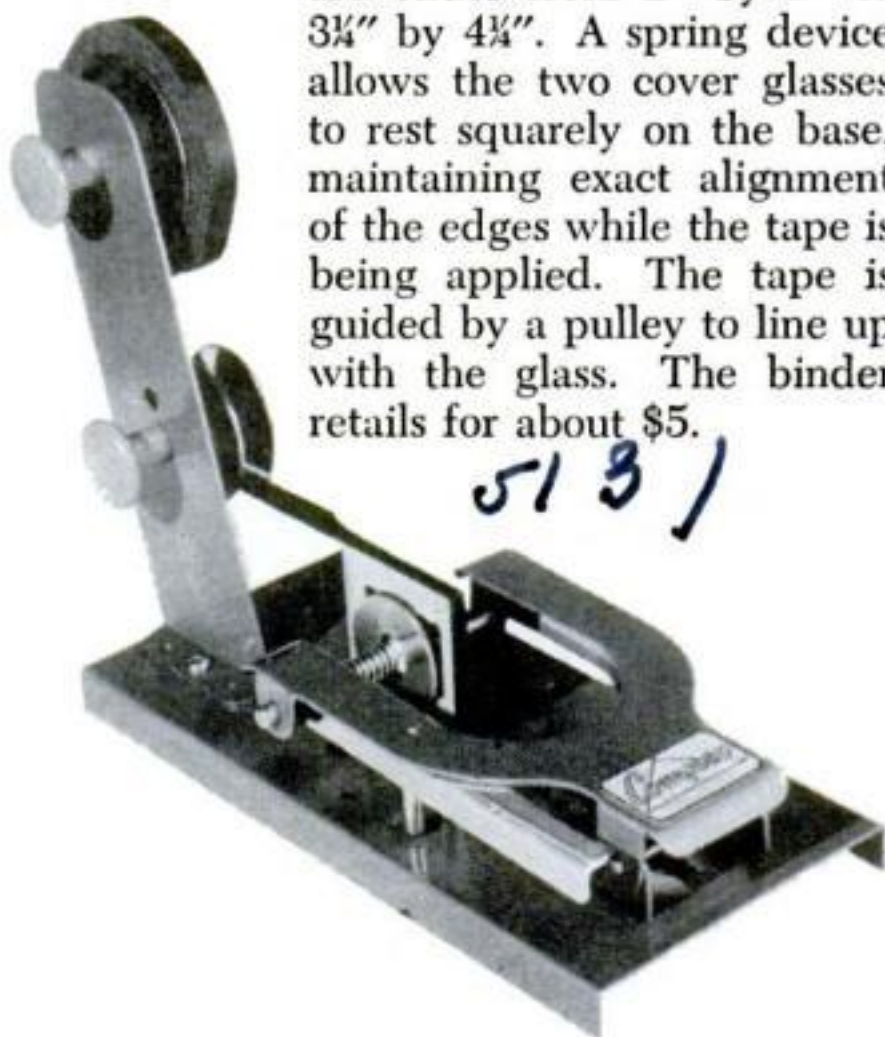
**Arrow Overcomes Parallax.** For twin-lens close-ups, center the subject in the finder, rest the square end of a cardboard arrow against the taking lens, and readjust the camera so the arrow points to the center of the subject.—Ken Murray, Colon, Mich.



**Film Washed in Can.** An ordinary tin can with holes punched or drilled around the lower rim offers a means of washing roll film thoroughly. After the loaded reel is in the can, place it under the faucet. The water then can flow out through the holes, carrying all the hypo with it. A fruit or vegetable can fits this particular tank reel. A coffee can could be used for the larger type.—R. P. Stevenson, Manhattan, N. Y.

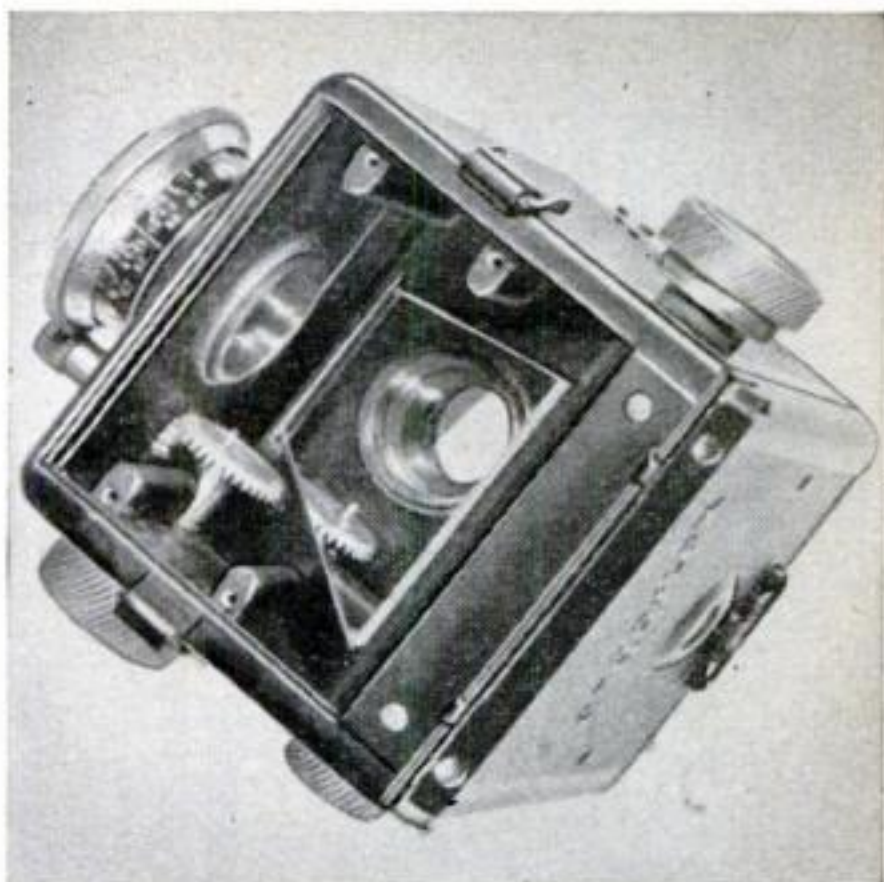
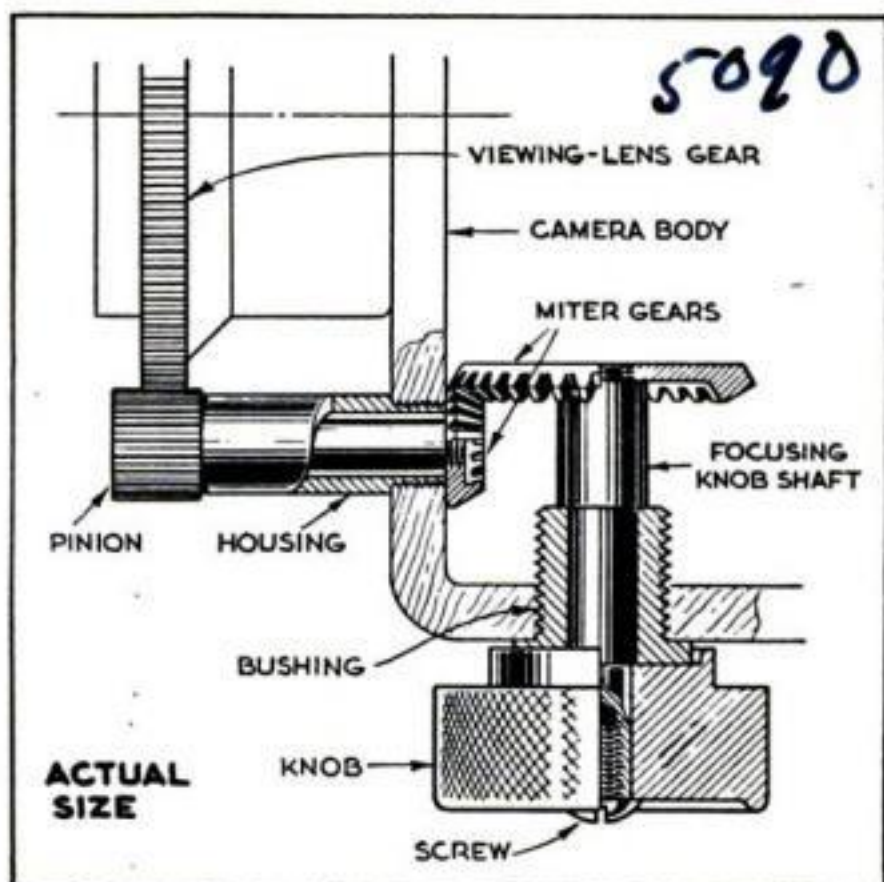
## Binder Guards Transparencies.

A new binder offered by the Comco Corporation, of Chicago, accommodates all standard slides from 2" by 2" to 3¼" by 4¼". A spring device allows the two cover glasses to rest squarely on the base, maintaining exact alignment of the edges while the tape is being applied. The tape is guided by a pulley to line up with the glass. The binder retails for about \$5.



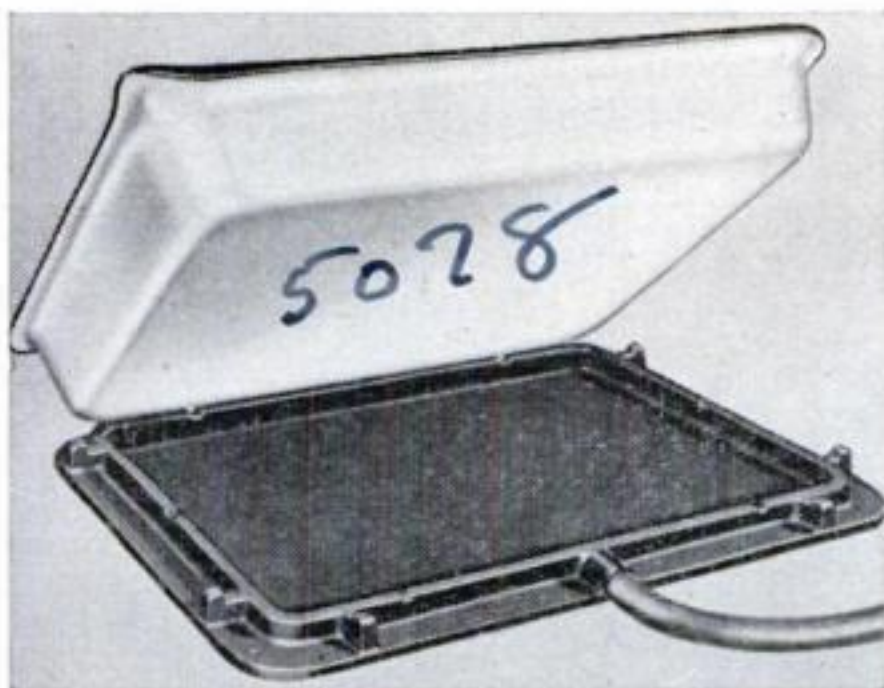
**Telephoto Lens for Reflex.** A supplementary lens introduced by the Morton Company, of Minneapolis, Minn., makes it possible to take telephoto shots with any camera. In the case of a reflex, the second lens can be placed over the focusing lens while framing the shot. Then it can be slipped over the taking lens. The lens is coated and has a built-in adapter ring for filters. Finders may be masked to suit.



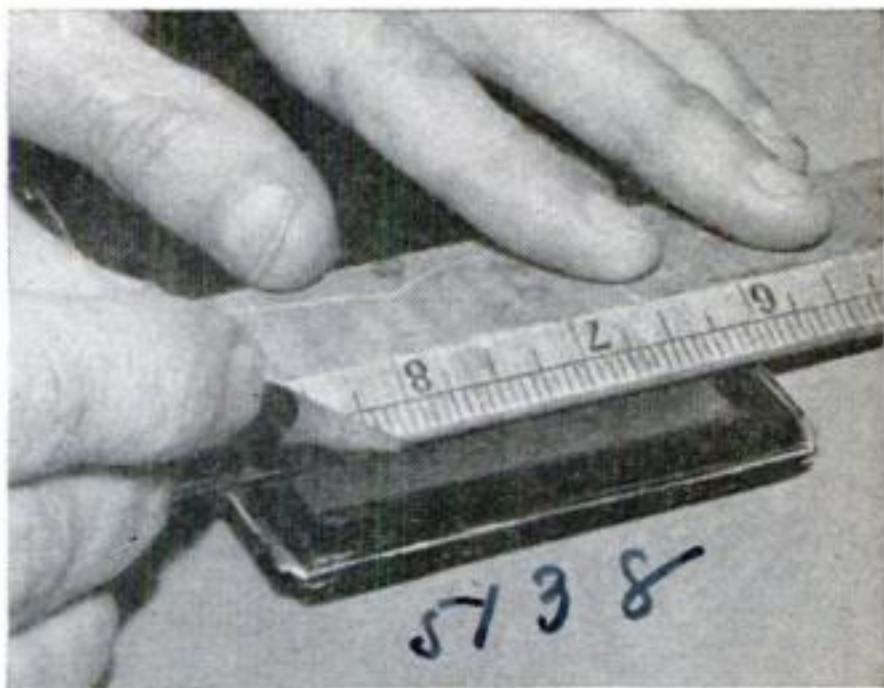


**Side Focusing Added to Reflex.** A side focusing knob that I have installed on my reflex camera increases both its usefulness and convenience. For instance, focusing while using a flash attachment was an awkward procedure without the knob. The knob overcomes this. About one turn covers the entire focusing range.

All parts were made of aluminum alloy. They are shown above actual size. The job may be done entirely on a lathe, except for the pinion gear that meshes with the viewing lens. This was cut on a milling machine after a fly cutter had been ground to shape with a lens-gear tooth as a template. The miter gears were purchased, and the hub projections faced off. The pinion that meshes with the viewing-lens gear was mounted about  $\frac{3}{16}$ " below the horizontal center line of the lens.—*John J. Harper, Atlanta, Ga.*



**Water Controls Temperature.** Water flowing through a molded rubber device introduced by the Morse Instrument Co., of Hudson, Ohio, keeps solution temperature even. A hose is connected to a mixer faucet and the water adjusted to the desired temperature. The tray of solution is then rested on the device in a sink or other spot where the water can overflow. It's now made only for 11" by 14" trays.



**Pencil Lines Aid Cropping.** When the image fills certain negatives to all edges, you often can't make a print to fill projection paper of normal proportions. For instance, an image that fills a  $2\frac{1}{4}$ " by  $3\frac{1}{4}$ " negative can't be printed to fill 8" by 10" paper except by lopping off one end of the image. To avoid this, make pencil lines on the ground glass, as above, or mask the finder to keep the image within a  $2\frac{1}{4}$ " by  $2\frac{1}{4}$ " area.



# Auto Radio Plays In Car or Out

Powered either by the car battery or its own rechargeable storage cells, this set offers real versatility.

**By Edward Blanton**

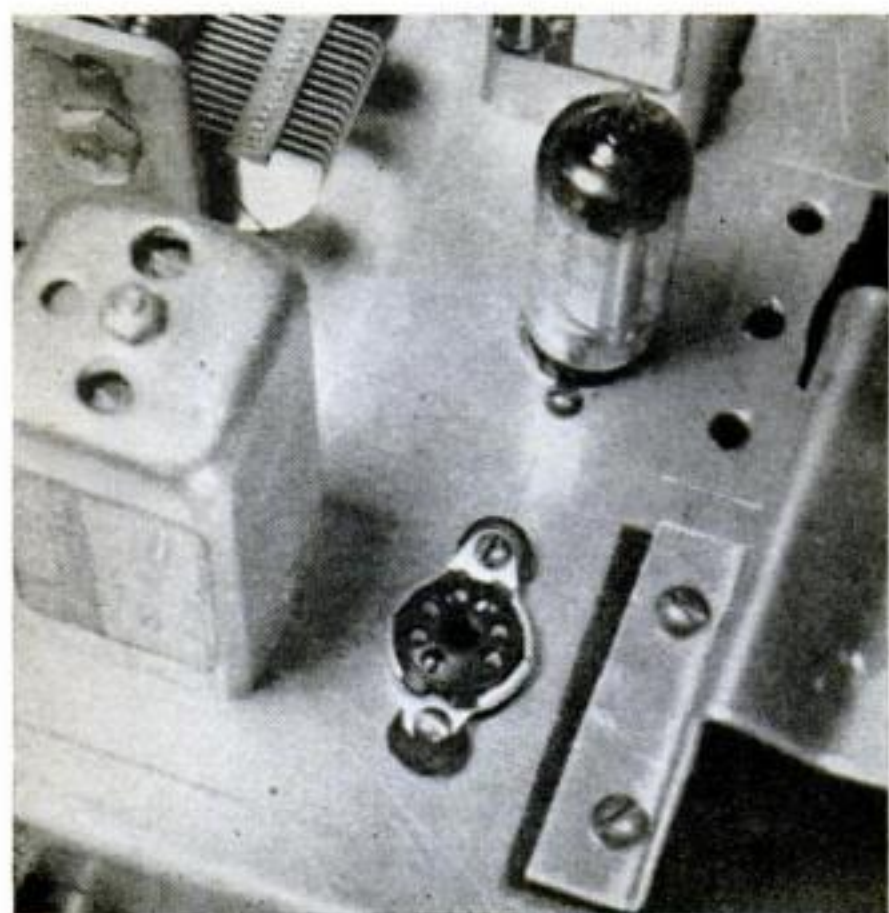
A RADIO can be as important a part of a day in the country as hot dogs and soda pop. It fills in that tired hour of the drive home, keeps you posted on news or ball scores, or brings your favorite music and comedy right out to the picnic grounds.

For all this you'd ordinarily need two sets—a portable plus one in the car. But not

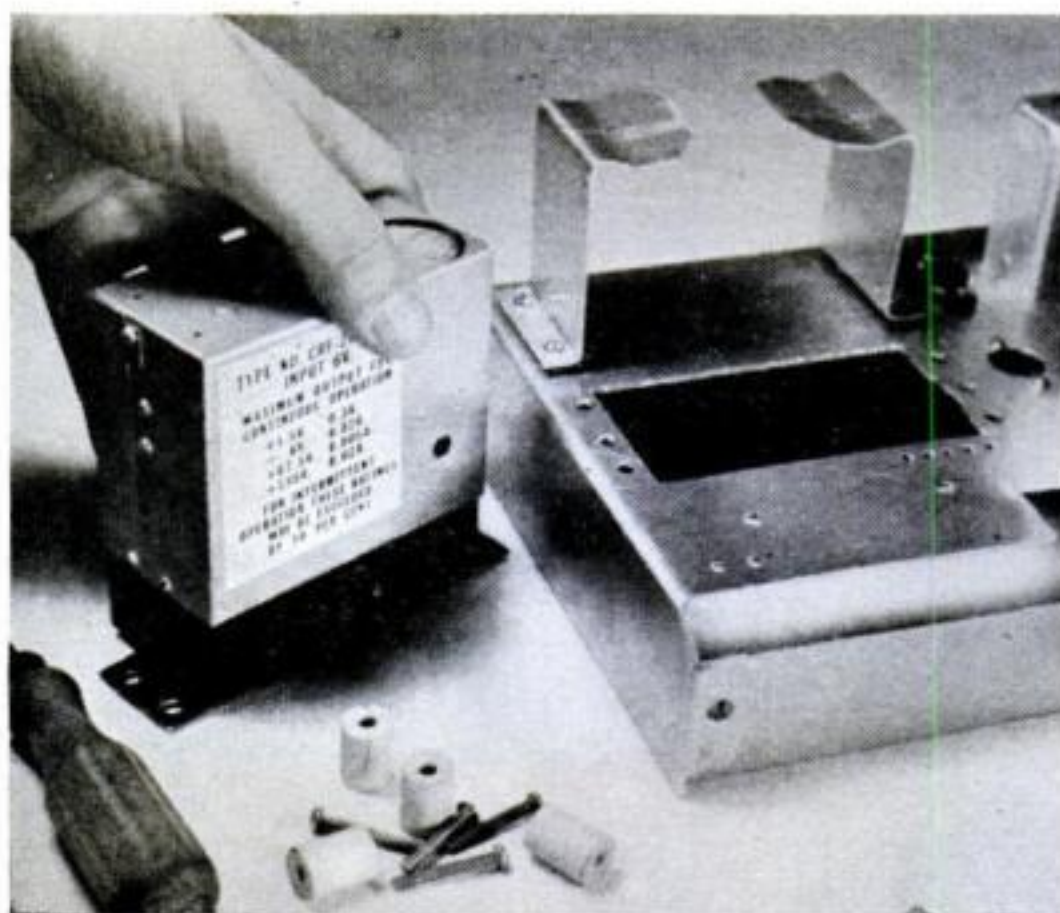


with the one double-purpose receiver pictured here. It's a self-contained portable that operates on its own rechargeable battery. Plug in a lead from the car battery, and it turns into a full-fledged auto radio.

Not every portable is suitable for car use, as you may already have discovered. It needs better-than-average volume to com-



Detector-tube socket is on rubber grommets to damp out vibrations and reduce microphonics.



Cut an opening in the chassis so the vibrator can be mounted partly above and partly below.



pete with road noises, and good sensitivity to keep it from getting off the beam as you drive farther away from the transmitter. This set has both, yet it's compact enough to be carried about easily.

Miniature tubes, coils, and other components partly account for the small size of this powerful receiver, but a couple of war-surplus items contributed the most important share. Both the small 6-volt storage battery and the filtered vibrator were made originally for the Navy; they were readily available in surplus stores at the time this receiver was built. The two items were purchased for \$5.50, of which \$1.50 was for the battery. This price, of course, may vary. These items are not standard, so make sure you have them on hand before you invest in other components.

The battery is encased in transparent polystyrene and measures approximately 1½" by 2½" by 3¾". It will run the set for about five hours on a charge, and can be recharged about 30 times. The vibrator, unlike most standard units, delivers a bias potential of -6 volts as well as B voltages of 67½ and 135, and 1.5 volts for the filaments. Don't try to use this battery with an ordinary vibrator or you may run into trouble on several counts. For one thing the drain will probably be too high. Also you would have to make provision for filtering and providing C bias voltage.

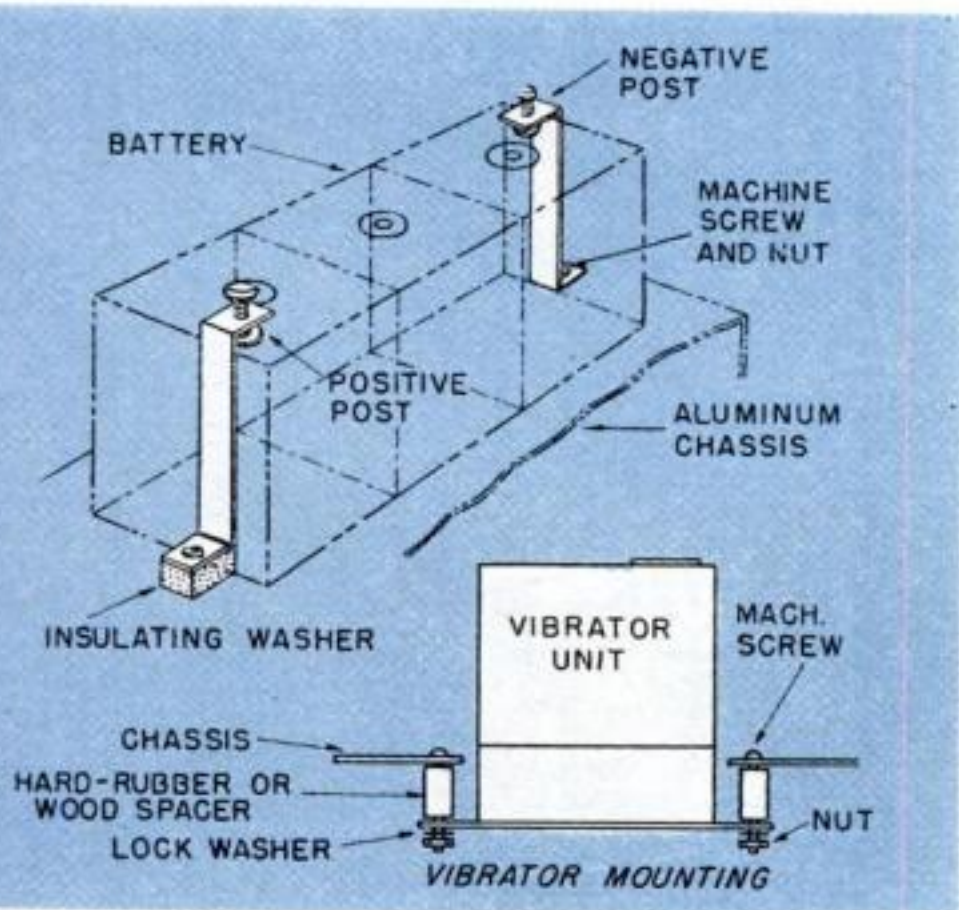
To get the sensitivity required, a tuned radio-frequency stage is used ahead of the converter. The first 1T4 tube is the heart

of this stage. An antenna coil, tuned by the first section of the three-gang variable condenser (C1A) is connected directly to the signal grid of this tube. As you can see in the diagram on page 196, a choice of two different antenna couplings is offered. Note that the telescopic antenna goes directly to the secondary winding of L1—that is, to the signal grid of the 1T4. This improves sensitivity, but somewhat reduces selectivity. The other connection reverses this situation. You will probably find that the external whip antenna (the one that you will install on the car) gives better results when connected to the small primary winding of L1, but you can juggle the inputs for best results.

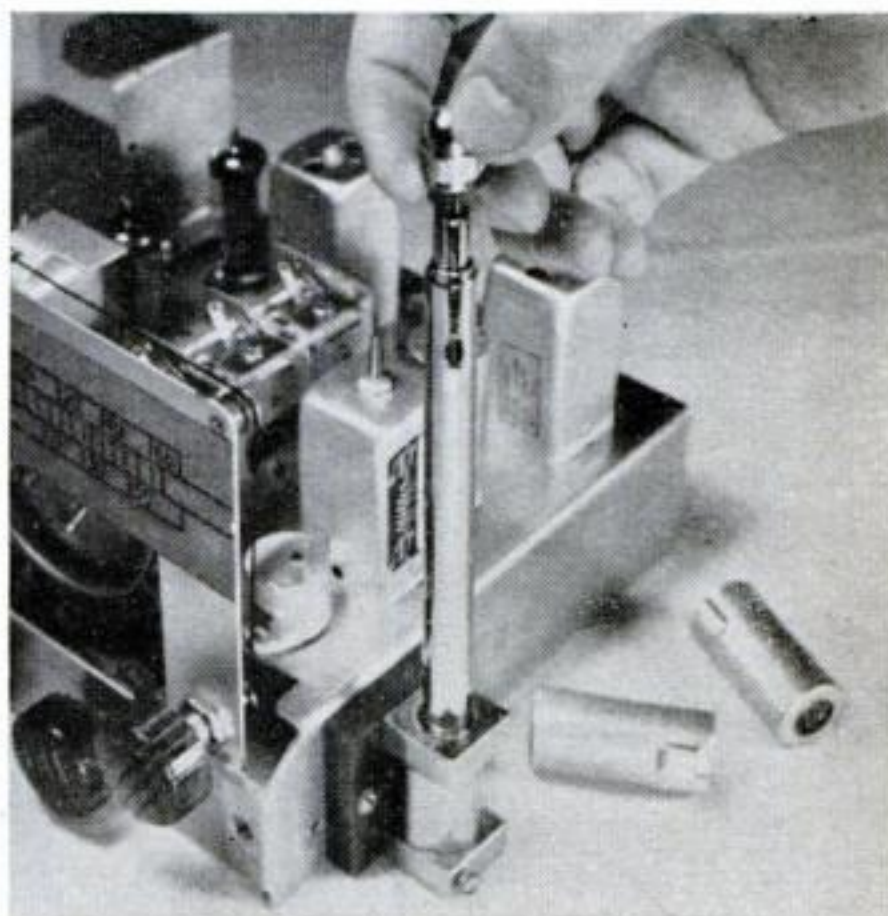
Both mixer and oscillator functions are performed by the 1R5 tube. An adjustable trimmer condenser (C4) with maximum capacity of 400-500 mmf. is wired in series with the third gang of the tuning capacitor (C1c) in order to reduce its capacity.

The output IF transformer is coupled to the diode detector portion of the dual-purpose 1S5. This tube is mounted on rubber grommets to cushion it against vibration. Movement, or even the backlash of sound waves from the speaker, might otherwise cause the tube to become microphonic.

The new 3A4 miniature power tube used in the output circuit can handle cleanly almost 1 watt of power. This is nearly equal in volume to that obtained from an AC-DC receiver and is ample for most conditions in a car or out. The current drain of the 3A4 filaments would overload the 1.5-volt

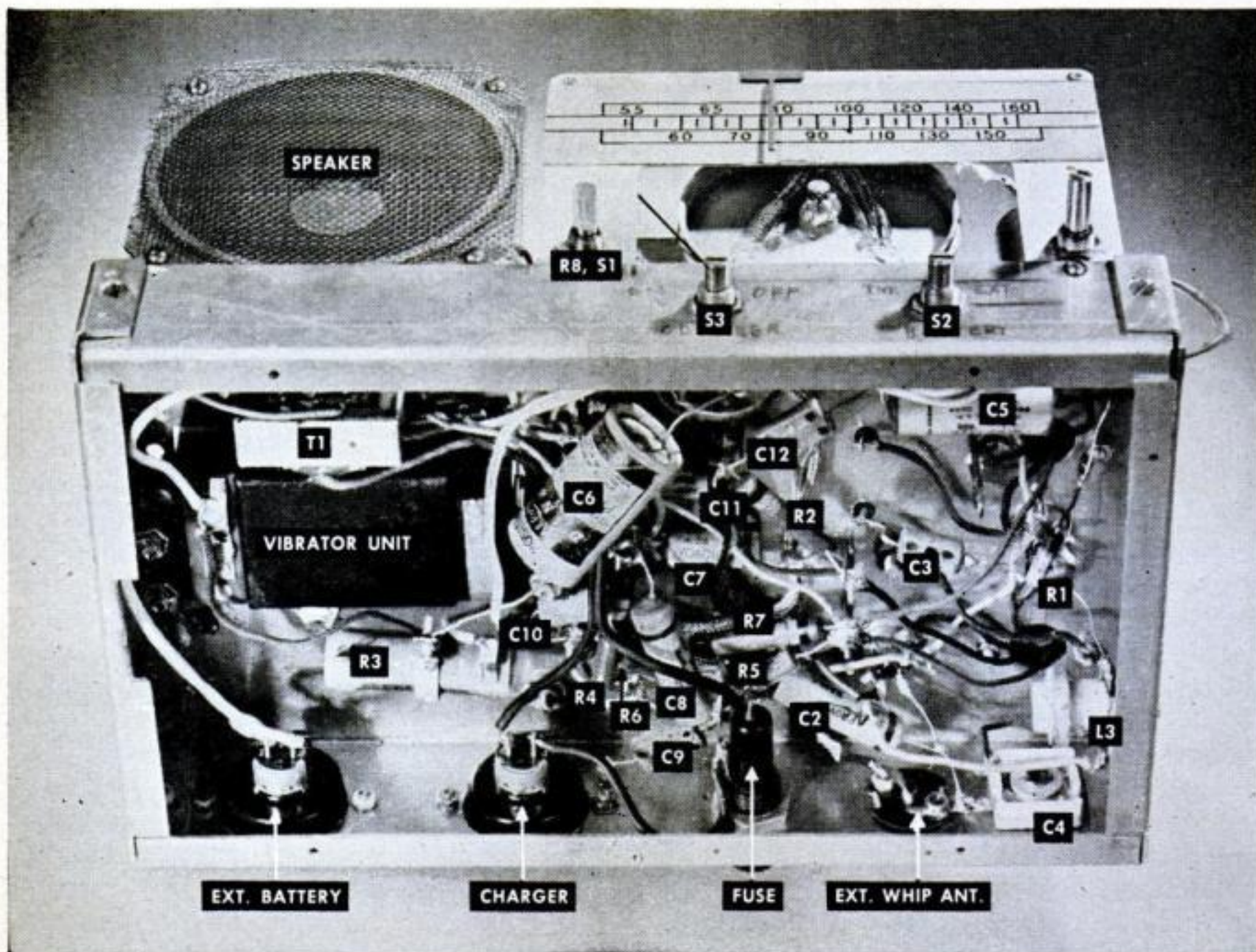


**Recommended methods** of installing the storage battery and vibrator are shown in this sketch.

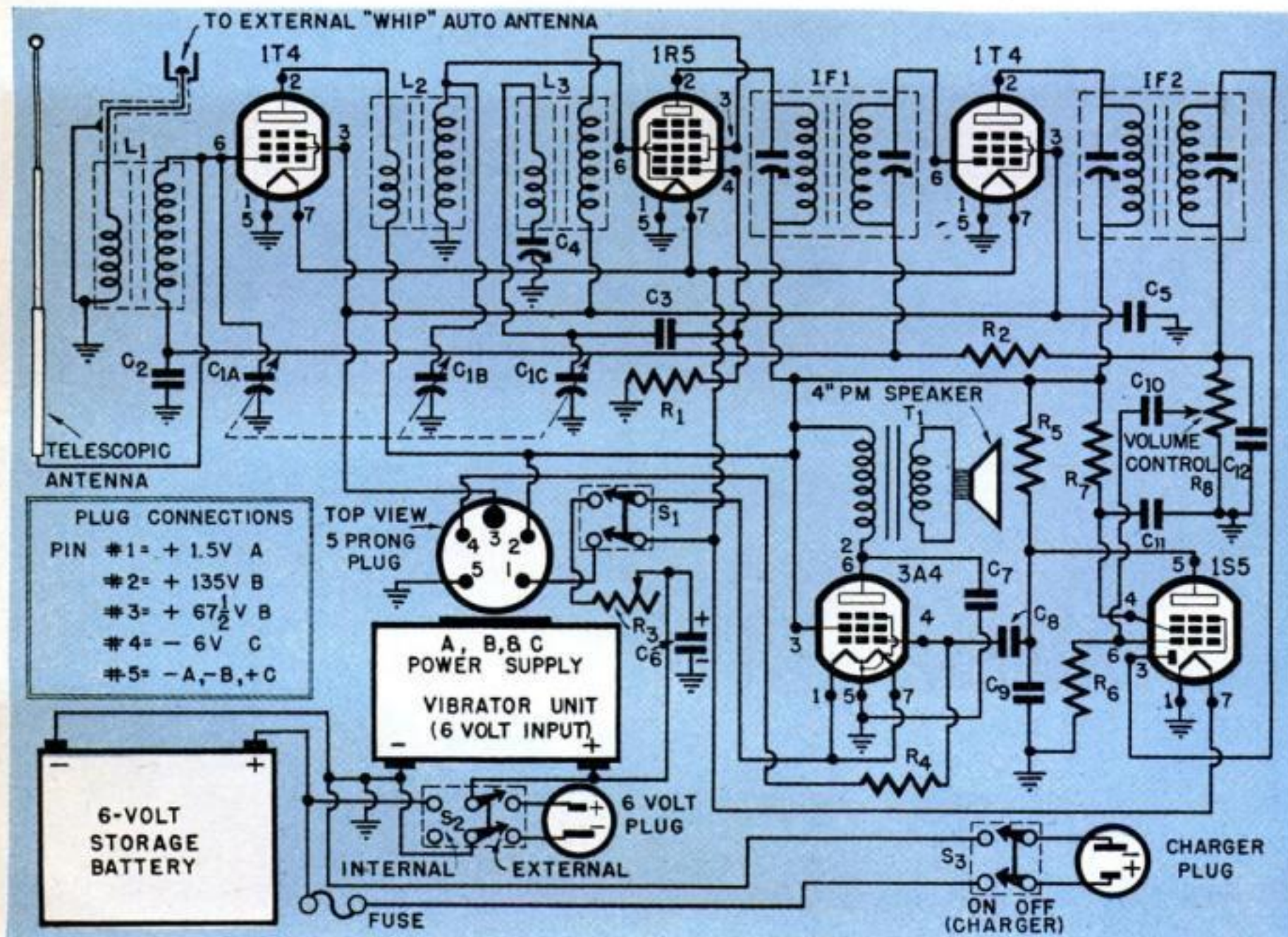


**For preliminary aligning** and checking, fasten the telescopic antenna directly to the chassis.

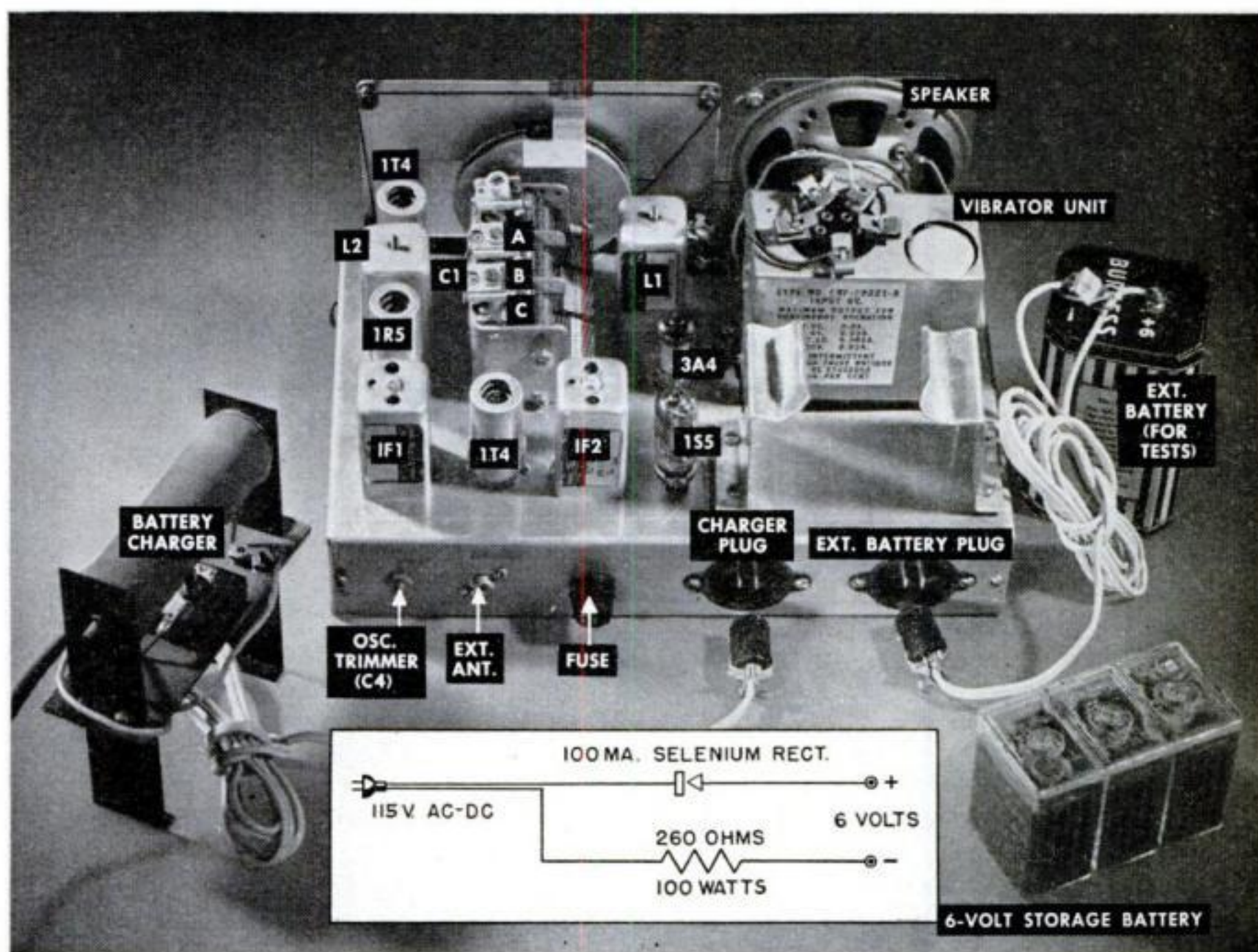




Depending on the cabinet you plan to use, you may have to rearrange the parts shown here.







Top view of the set and accessories. The charger, left and inset, works on house current.

tap of the vibrator, so the tube is fed directly from the 6-volt battery. In order to drop the 6 volts to 1.5, a 25-ohm, 10-watt wire-wound resistor (R3) is placed in series with the leads. This is an adjustable resistor. Set it at maximum and move the slide inward gradually until the voltage across pins 1 and 5 of the 3A4 reads 1.5. (If you don't have a low-range voltmeter, you had better get one since you'll need it later on to check the battery). In conjunction with C6, R3 forms part of the hash filter.

Hash is the noisy buzz created by the vibrator, and it may vary from set to set. In this case a dry electrolytic of 100-mfd. capacity was found to be adequate for C6. You may have to increase this to 500 mfd.

Laying out the parts for this set calls for some calculation in terms of your own specific needs. Remember that you not only want to get the whole works into a compact portable case, but that you must also proportion it for a convenient fit in the car.

In some autos there will be sufficient leg

### LIST OF PARTS

All carbon resistors 1 watt.  
R1: 75,000-ohm carbon.  
R2: 3-meg. carbon.  
R3: 25-ohm, 10-watt adjustable wire-wound.  
R4, R7: 1-meg. carbon.  
R5: 250,000-ohm carbon.  
R6: 5-meg. carbon.  
R8: 1-meg. potentiometer with DPST switch (S1).  
All paper condensers 400 volts.  
C1 A, B, C: 3-gang tuning condenser, 365 mmf. each section.  
C2, C8, C11: .05-mfd. paper.  
C3: .0001-mfd. mica.  
C4: .0004-mfd. adjustable trimmer.  
C5: .1-mfd. paper.  
C6: 100-mfd., 25-volt dry electrolytic (see text).

C7: .004-mfd. paper.  
C9, C12: .0002-mfd. mica.  
C10: .005-mfd. paper  
L1: Adjustable iron-core antenna coil.  
L2: Adjustable iron-core RF coil.  
L3: Air or iron-core oscillator coil, 456 kc. (must be shielded if placed above chassis).  
IF1, IF2: Iron-core IF transformers, 456 kc. input and output (output for single-diode detection).  
S1, S3: DPST rotary (S1 on R8).  
S2: DPDT rotary.  
T1: Universal output transformer.  
6-volt nonspillable storage battery (Willard NT-6, or Navy type CWB 19046).

Low-drain vibrator (Navy type CRF 20221-A). Input, 6-volts; output, 1.5, 67½, 135, and -6 volts.

4" P.M. speaker; tuning-dial assembly; telescopic antenna (approx. 28" extended); aluminum chassis, 2" by 7" by 11" or other; crackle-finish cabinet 6" by 7" by 12" or other; 5-prong plug for vibrator; miniature tubes and 7-pin sockets; miniature tube shields (three); connector for external antenna; polarized recessed plugs (two) for charger and external battery, with matching female connectors; fuse and holder for chassis mounting.

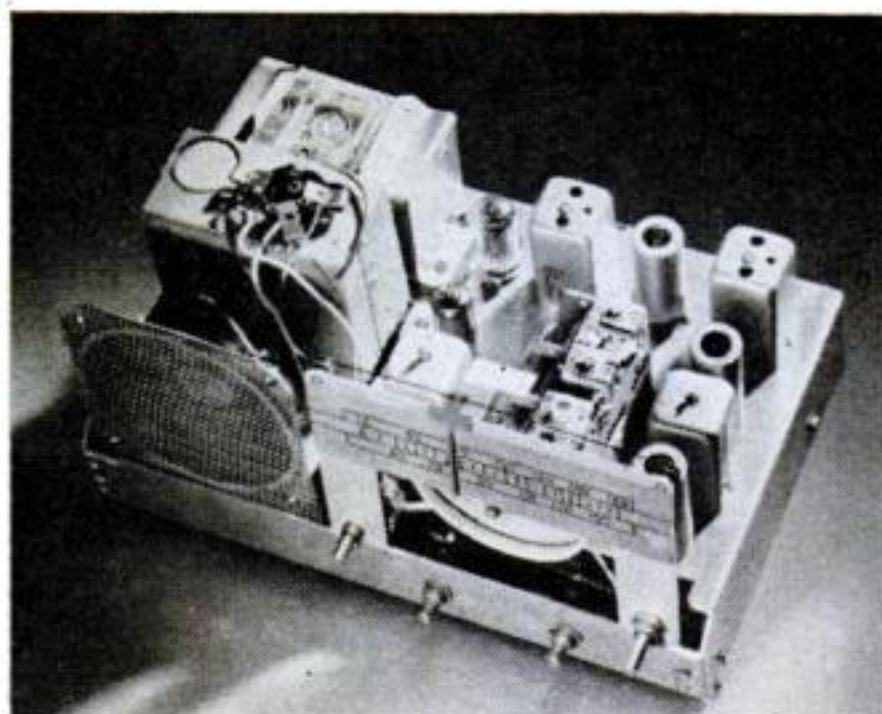


room to allow for mounting under the dash; in others this position will guarantee a scored shin every time you get in or out. Perhaps you will find it more convenient to bring battery and antenna leads up through the back of the seat and keep the set next to you. Or maybe you want to mount it on the rear-window deck.

Whichever way you decide to do it, figure out your maximum allowable dimensions before you start to lay out the chassis. To keep over-all height to a minimum, the chassis in this set was cut out so that the vibrator unit and the speaker could extend both above and below. The sketch at the bottom of page 195 gives a suggestion for mounting the vibrator. Note in the same sketch the recommended method of installing the storage-battery clips. The narrow posts shown in the drawing are probably better than the wide bands that can be seen in the photos, since they are less likely to cover the vent holes in the battery. Also the screws give positive electrical contact.

Ventilation of the battery cells is extremely important. Provide a removable back or several fair-sized holes in the cabinet if you plan to charge the battery in the set. Without ventilation the active gases created during charging will cause corrosion of the metal parts. A touch of petroleum jelly will help to protect the contacts.

There are two ways of charging the battery, and you will undoubtedly find it desirable to use both at different times. One is by means of a house-current charger shown on page 197 and diagrammed in the inset.

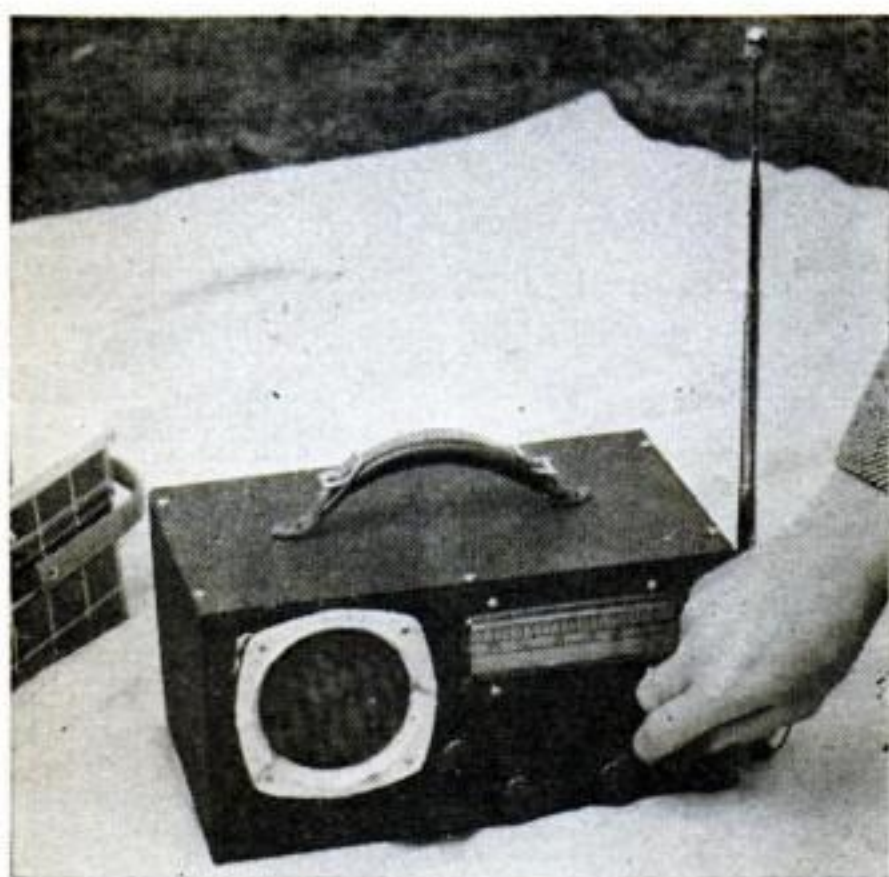


**Complete** except for the case, this combination radio is no larger than a good-sized portable.

The output of the charger may be connected directly to the battery terminals (observing polarity, of course) or the leads may be plugged into the appropriate contacts on the back of the chassis. You can leave this charger on for about 20 hours.

The other charging method consists of connecting the radio battery in parallel with the car battery.

Once you have the parts mounted and wired, the next step is to align the tuned circuits of the receiver. With luck this may be done by ear, but the most reliable method is to use a signal generator. If you don't have one you can undoubtedly get a local service man to peak the set for you. Make sure that you test both the internal and external battery circuits. For the latter you can use a 6-volt lantern battery. **END**



**Working on its own battery**, the set is ideal for picnics, boating trips, or beach parties.



**Plug in the car battery** and your whip antenna, flick the switch, and you have an auto radio.









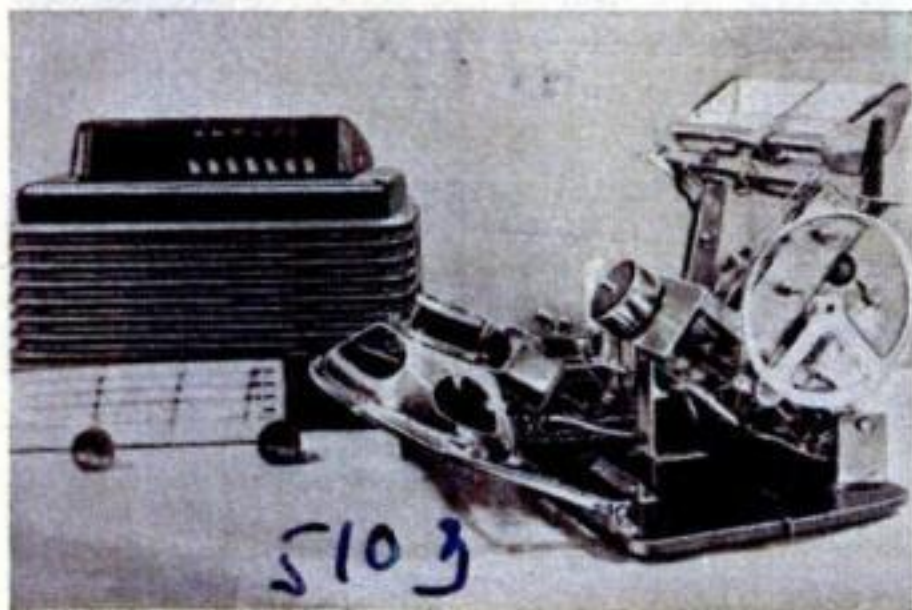




5029



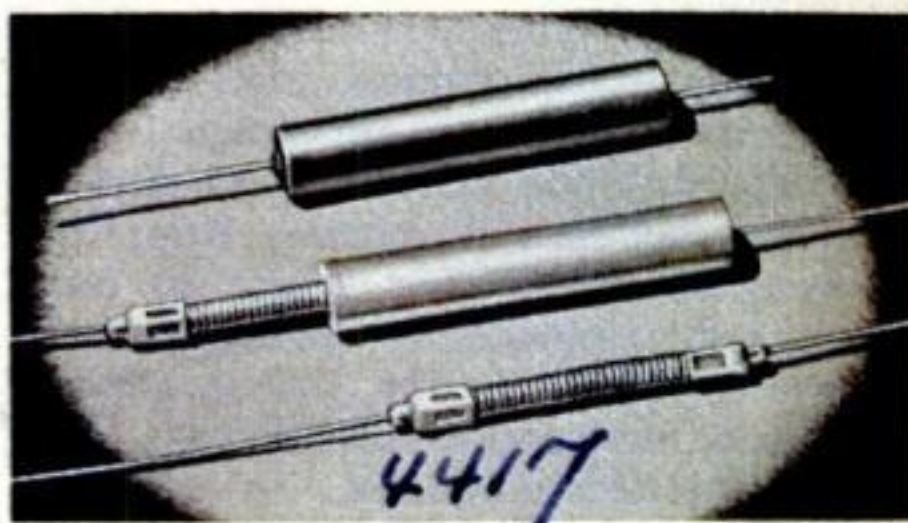
**Battery Cells Interlock.** A new type of dry-cell battery has been developed for portable radio and hearing-aid use by Olin Industries, Inc., New Haven, Conn. The electrolyte is packed into molded plastic cells which are shaped with interlocking flanges so that they can be assembled in stacks. This construction is used in what is said to be the smallest 67½-volt battery ever to be manufactured commercially. It's half the size of standard batteries.



**Radio Opens for Servicing.** Removing one bolt from this British-made radio allows the chassis to hinge open, making every part readily accessible for testing and servicing. Shown recently at the British Industries Fair in London and Birmingham, the new receiver, called the Ultra Radio Ⓢ, is pictured above together with its plastic cabinet.



**Clamps Molded in Plastic.** Corrosion-resisting cable clamps of tough molded plastic lessen the possibility of short-circuiting worn wires and cables. American Molded Products Co., Chicago, makes the clamps in three sizes.



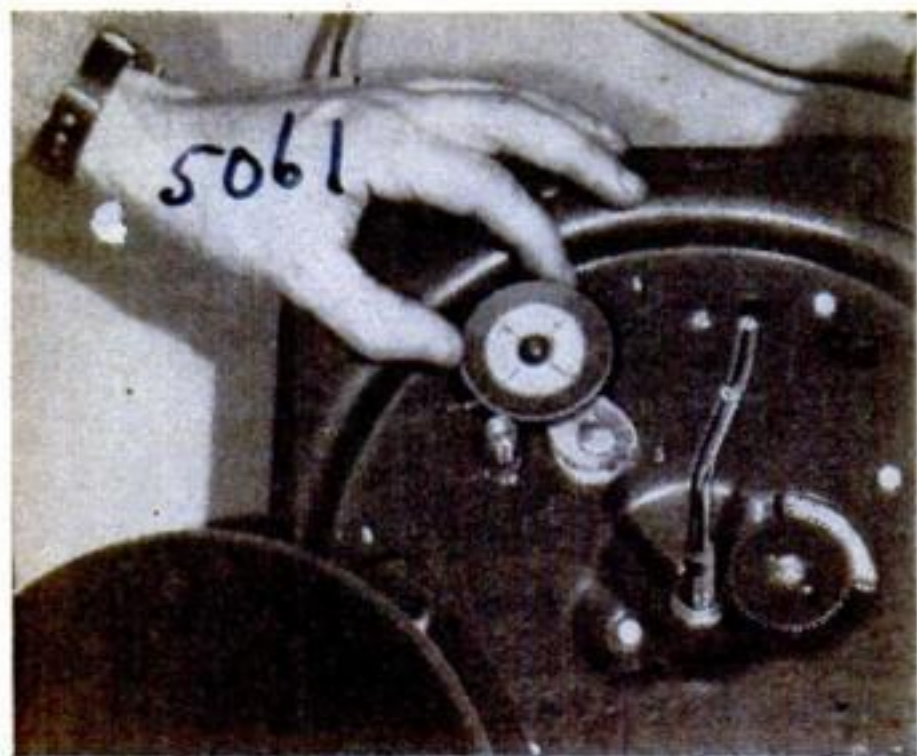
**Resistors Cased in Ceramic.** Midget wire-wound resistors, sealed in steatite tubes, can be used in place of bracket-mounted resistors where space is at a premium. Rated at 7 watts, these Greenohm Juniors Ⓢ, made by Clarostat, measure only 5/16" dia. by 1¼" and are made in values from nearly zero to 5,000 ohms. They come with 2" bare pigtail leads.

### Antenna Mounts on Chimney.

A mast holder that can be installed on any chimney in a few minutes will ease the problem of installing television and FM antennas. Two galvanized steel bands large enough to encompass any chimney are supplied with the mount. The unit can also be screwed to the side of a building or to a wooden post. South River Metal Products Company, South River, N. J., makes the mount to sell for \$7.50.







### Flat on Idler Bumps Turntable

RUBBER-COVERED idler wheels used between the driver and turntable rim on rim-driven phono motors may develop a flat if left standing in one position. Flats cause an audible bump at every revolution of the turntable; they are most likely to develop during the hot summer months. Before going away for the summer, unseat the turntable to relieve pressure on the idler. And if the trouble should develop, you can replace the idler or turn it down carefully on a lathe to restore perfect roundness.

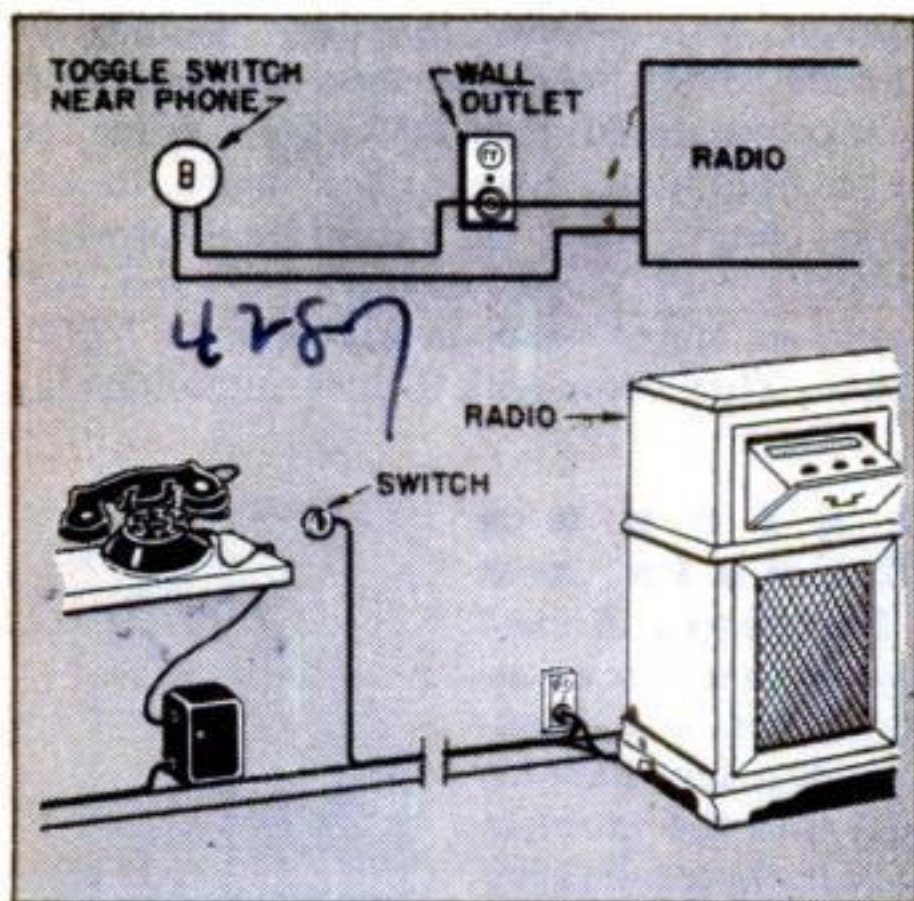
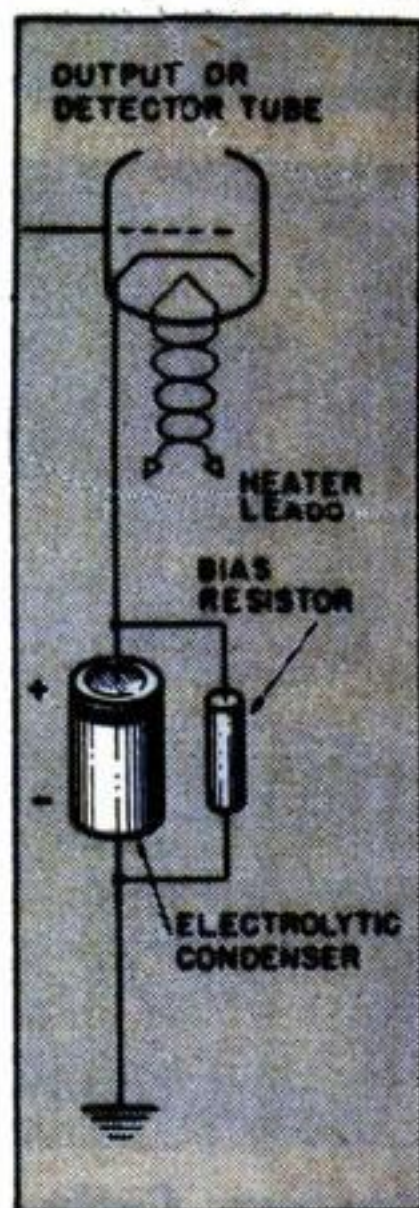
64565

### Troubles Traced to Condensers

DISTORTION, loss of volume, and squealing in a radio can often be traced to a faulty electrolytic condenser in the cathode of the power output tube. A typical value of this condenser is 25 mfd., 50 volts.

When a set suddenly loses volume but can be brought back by banging the cabinet or flicking a light switch in the room, the electrolytic in the cathode of the second detector (57, 6C6, 6J7, etc.) may be leaky. Its value is 5 mfd., 25 volts.

In replacing either of these bias condensers, connect the positive terminal to the cathode and the negative lead to the chassis or other ground.—Frank Tobin, Manhattan, N. Y.



### Switch Near Phone Cuts Radio

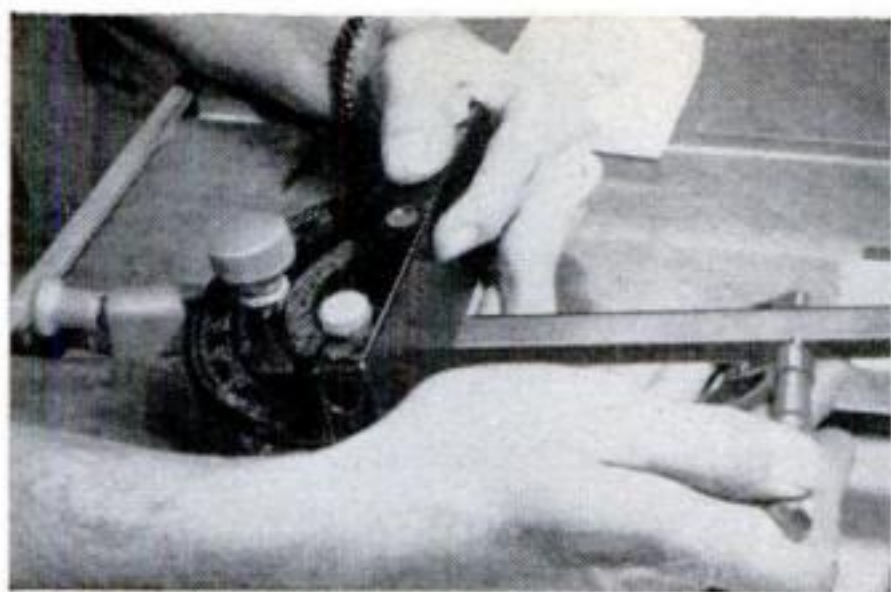
TIRED of running to reduce radio volume every time the phone rang, we mounted a toggle switch near the telephone. By connecting it in series with the radio line cord, we can now turn the set off right at the phone. The wire leading from switch to radio is stapled to the baseboard.—Arthur Trauffer, Council Bluffs, Iowa.



### Tape Reduces Shock Hazard

THE tiny zeroing screw on the face of a 0-300-ma. plate meter on a transmitter proved to be loaded with high voltage. An accidental touch produced a painful and unexpected shock. To prevent recurrence, I covered the head with adhesive tape. It is easily removed when adjustment is necessary.—D. J. Bachner, Queens, N. Y.





**Check the wear** on the miter-gauge bar with a micrometer. Heaviest wear occurs at the ends.



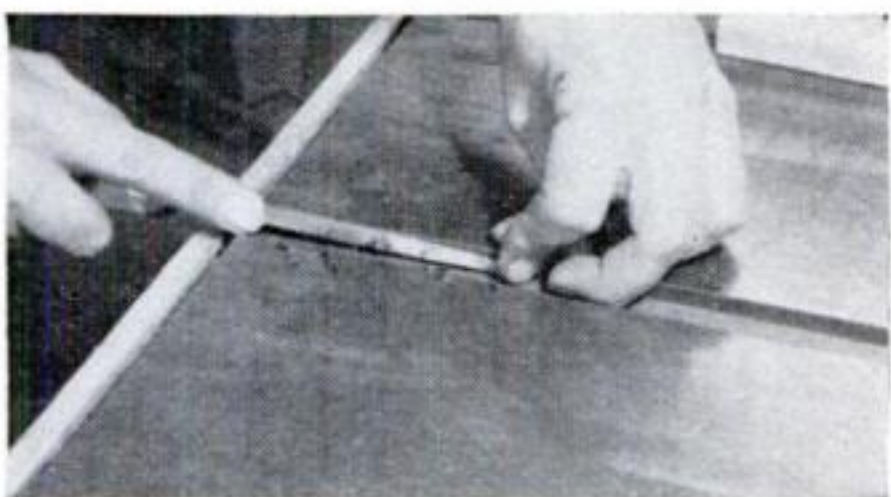
**Hammer out** extra width on the ends of the bar to compensate for the amount that's worn away.



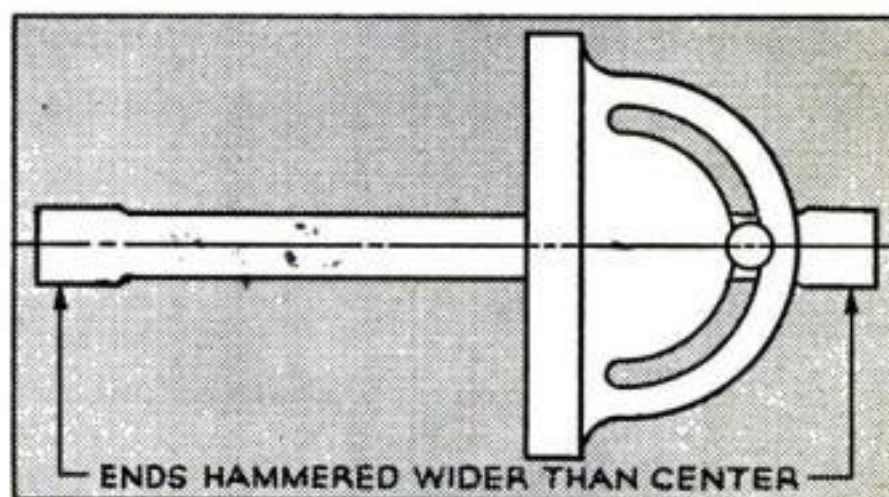
**File the edges** of the widened area until the bar just fits snugly. Keep the edges square.



**The table groove** also may wear. If the bar binds at certain points, file the groove there.



**Use a triangular file** to clean out the groove corners. Check the fit of the bar frequently.



**Flatten the bar** once more and file the edges again if dressing the groove leaves it slack.

5190

# Restoring the Accuracy of a Miter Gauge

HERE'S a method of reconditioning the miter-gauge bar of an old circular saw. If the bar is worn to a slack fit in the table groove, it's hard to cut accurate angles.

Heaviest wear on the bar usually occurs at the ends. The groove wears away at the center. You can check the bar with a micrometer or calipers.

As the first reconditioning step, remove the head and hammer the ends of the bar for about  $1\frac{1}{2}$ " until they are wider than the groove. In the drawing above, the hammered ends are exaggerated.

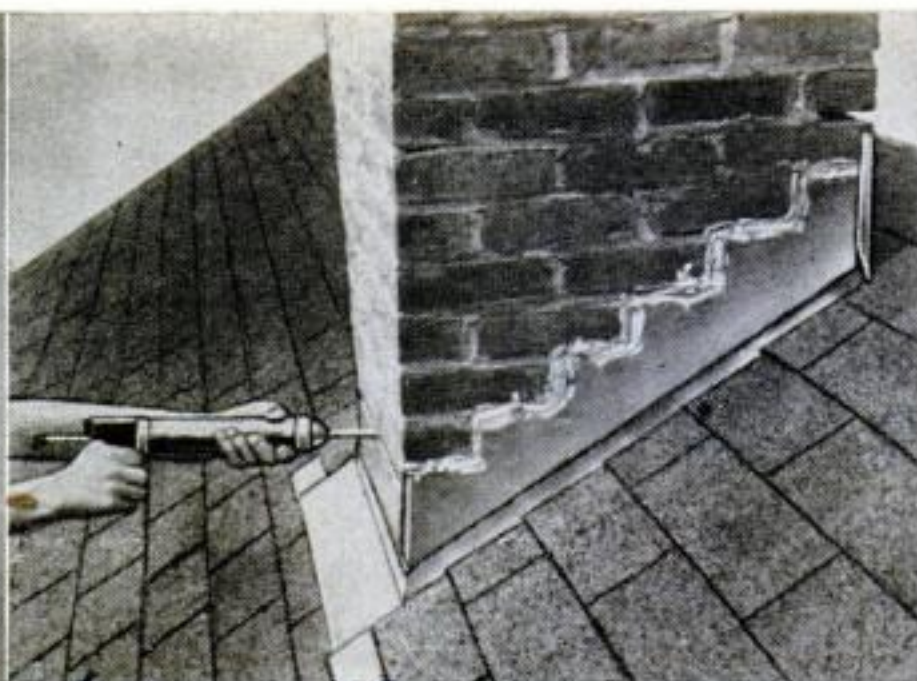
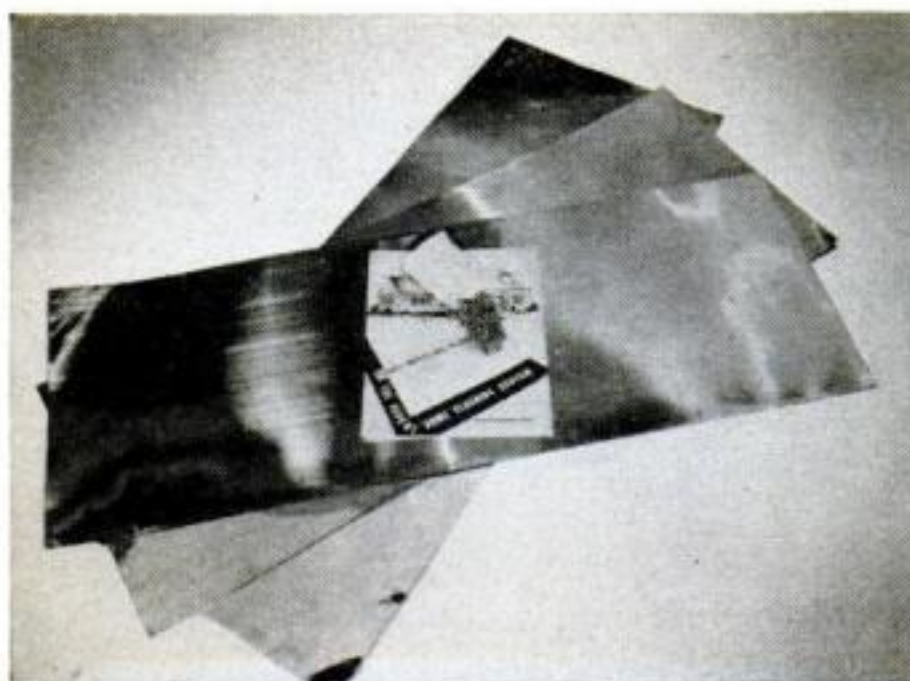
With a flat file, dress down the hammered edges until the bar fits the widest part of

the groove, often at the near side of the table. Make certain the filed edges are parallel with the centerline of the bar. Chamfer the corners to prevent binding.

In most cases, this should complete the job. However, there are times when the bar is a snug sliding fit in part of the groove but binds elsewhere. In this case, dress down the narrow spots in the groove, using a flat file on edge. Finish the corners with a triangular file.

Try the fit of the bar frequently. When it slides freely, reassemble the head, adjust the stops, and you're ready to put the saw to work.—Whitney K. Towers, Los Angeles.





## Flashings Material Offered in Handy Man's Package

MANY handy men hesitate to tackle the job of installing roof flashing. But Revere Copper and Brass, Inc., has just introduced a package of materials, complete with illustrated instructions, to show the ordinary home owner how to do this work at all vital points.

Priced at about \$20, the package includes ten 18" by 48" copper sheets and 200 bronze nails. Two packages are said to

contain sufficient material for the average house. The copper sheets are easily formed to any desired shape and nailed into place without special tools.

At the left above are some of the sheets. The 48" dimension was chosen as adequate for flashing the head of standard windows and doors. On the roof, the 18" width fills most valley requirements. Instructions include tips for making craftwork of scrap.

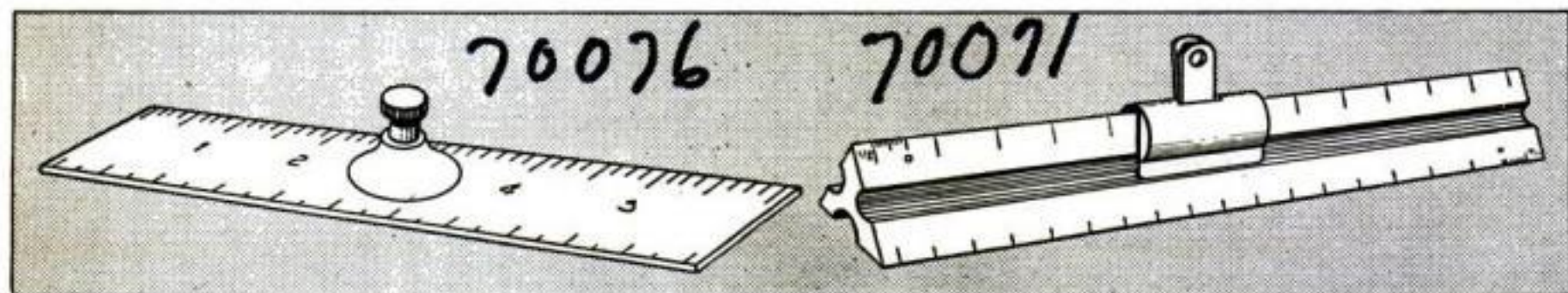
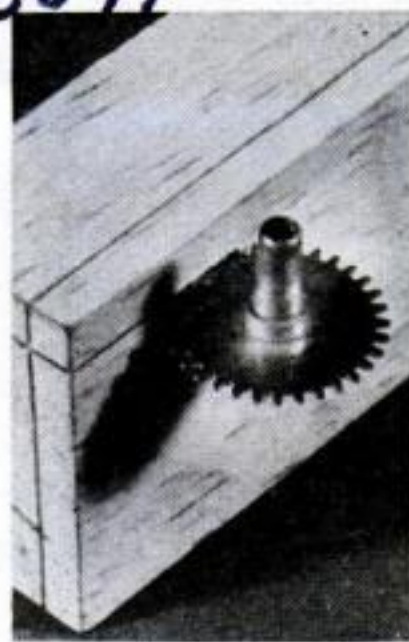
## Plugs Protected with Plaster



VACUUM-CLEANER, toaster, and other frequently handled electric plugs are less subject to damage if the plug is filled with plaster of Paris. A bit of cloth stuffed around the cord opening will hold the plaster in the plug until it has set.—R. F. Donovan, Jersey City.

## Clock Gear Substitutes as Saw

A CLOCK gear may be used in a drill press as a small saw. It's useful for cutting fine slots or kerfs in model work. The teeth can be filed sharp. Feed the work easily, making several light cuts to the required depth, against rotation.—Herbert Pfister, Bronx, N. Y.



## Paper Clip and Suction Cup Help You Use Ruler

Two ready-made conveniences for handling flat and triangular rulers are a small suction cup and a spring-type paper clip. Press a suction cup in the center of a flat ruler, and you can pick it up easily. Archi-

itects, engineers, and others using a triangular scale will find that the clip facilitates manipulation of the ruler and keeps the scale on the side being used.—M. A. Jacobson, Chicago.

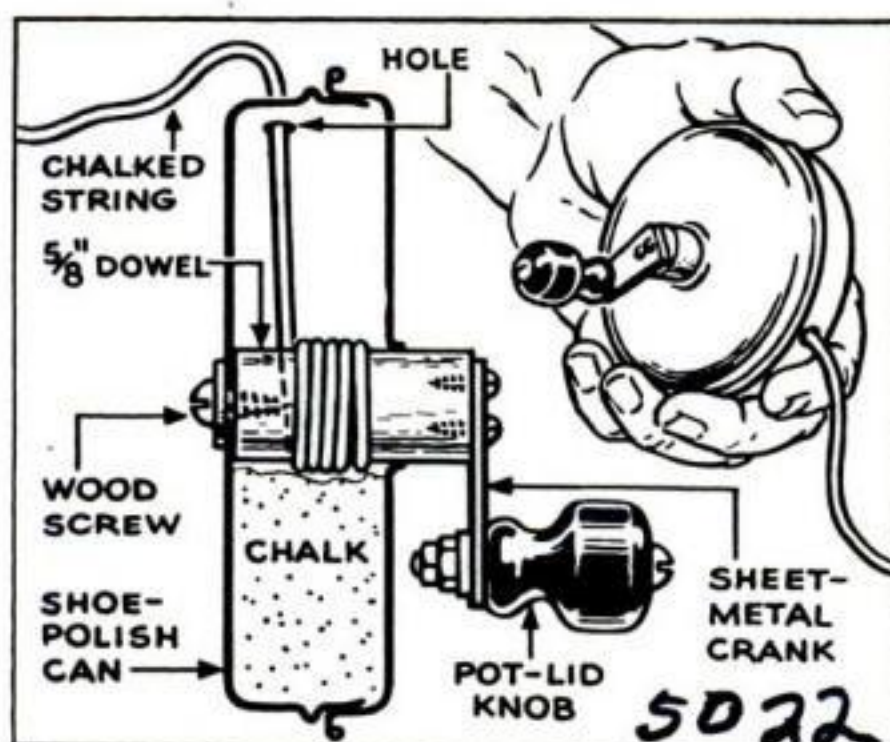
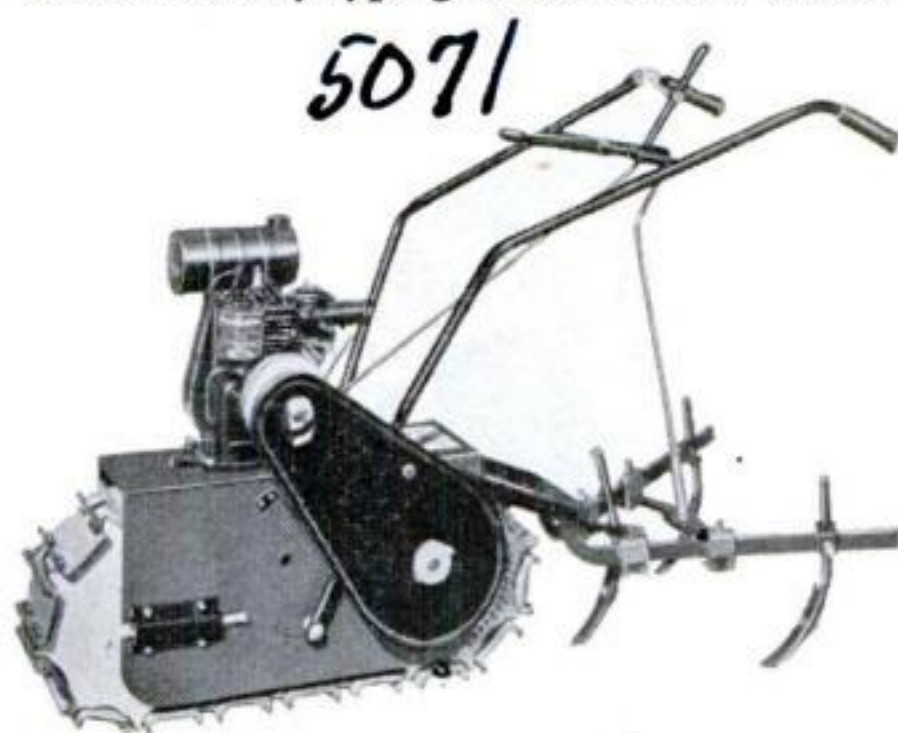


## Crawler-Type Tractor Moves Between the Rows

PROPELLED by a 1½-hp. gasoline engine, this caterpillar garden tractor has good traction on any type ground. Since it travels

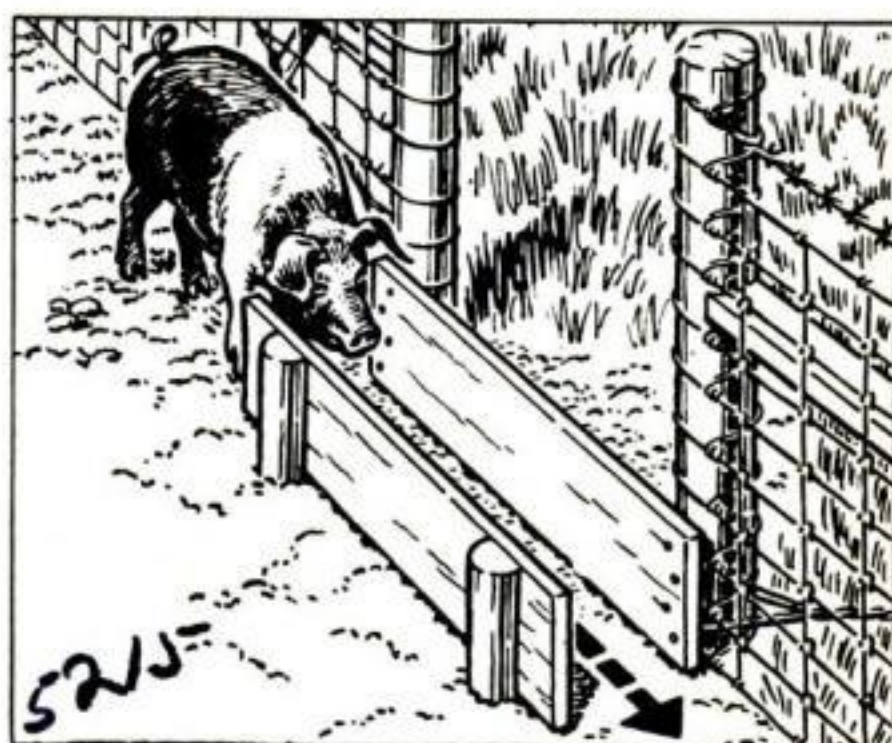
between the rows, instead of straddling them, the tractor can be used even after plants reach shoulder height. Although it

weighs 230 lb., it is easily maneuverable. Gas, clutch, and cultivator controls are located on the handle bars. Cultivator teeth are adjustable from 9" to 24" width and to a maximum depth of 5". The revolving track is 7½" wide. The tractor is a product of the Gray Company, Inc., Minneapolis, Minn.



### Polish Can Holds Chalk Line

AN EFFICIENT carpenter's chalking line may be made from a shoe-polish can. Drill the holes in the top and base of the can for the dowel and the wood screw. Cut a piece of sheet metal for the crank and use a pot-lid knob for a handle. Fasten an end of the string to the dowel with a small tack. Half fill the can with powdered chalk. The line is rechalked each time it is rewound.—*Roland Cueva, Manhattan, N. Y.*



### Board Blockade Fools the Pigs

A PIG's life is a tough one. The grass always looks greener in another field—but what are pigs going to do when up against a contraption like this? They can walk between the boards, but there just isn't room to turn and head toward the places they're not supposed to be. Nor will they scramble over the boards, for they dislike scraping their bellies over an edge.—*Marion L. Rhodes, Knightstown, Ind.*

### Water Pan Protected by Inverted Hamper

CHICKENS frequently overturn their water pans or scratch dirt into them. A simple guard for the water pans can be made from regular tomato hampers. Remove every other stave, sawing through the center hoop which is stapled to each stave. It is a good idea to place a weight, such as a rock, on top of the hamper to keep it from being overturned.

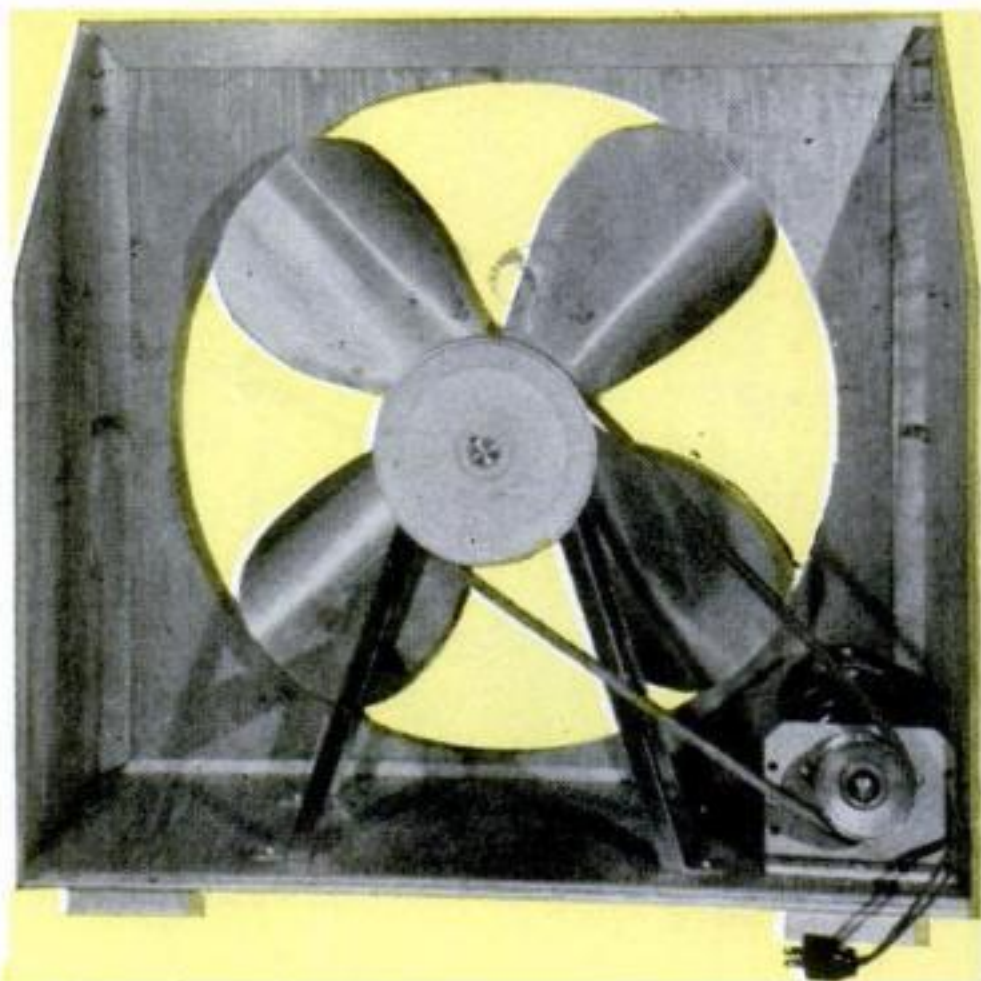


5037



5017 5076

# Homemade Exhaust Fans Beat the Heat



**Whether you need just a little window ventilator or a husky attic fan, this article will give you plans and tips.**

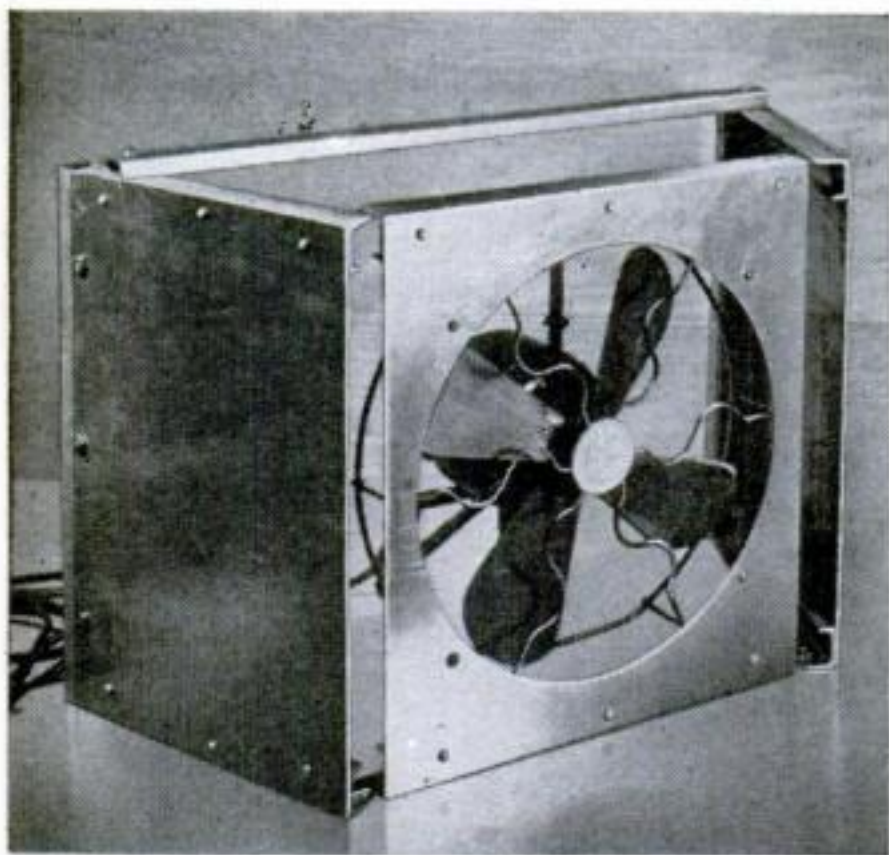
**C**OOLING achieved by an exhaust fan is generally more satisfactory than cooling obtained with a table or floor fan. Instead of being a mere air stirrer, an exhaust fan works by replacing heated or contaminated air with cooler or fresher air.

For cooling or ventilating a single room, an 8" to 12" fan installed as a window ventilator is often valuable. Ordinarily placed to discharge outward, it can be turned

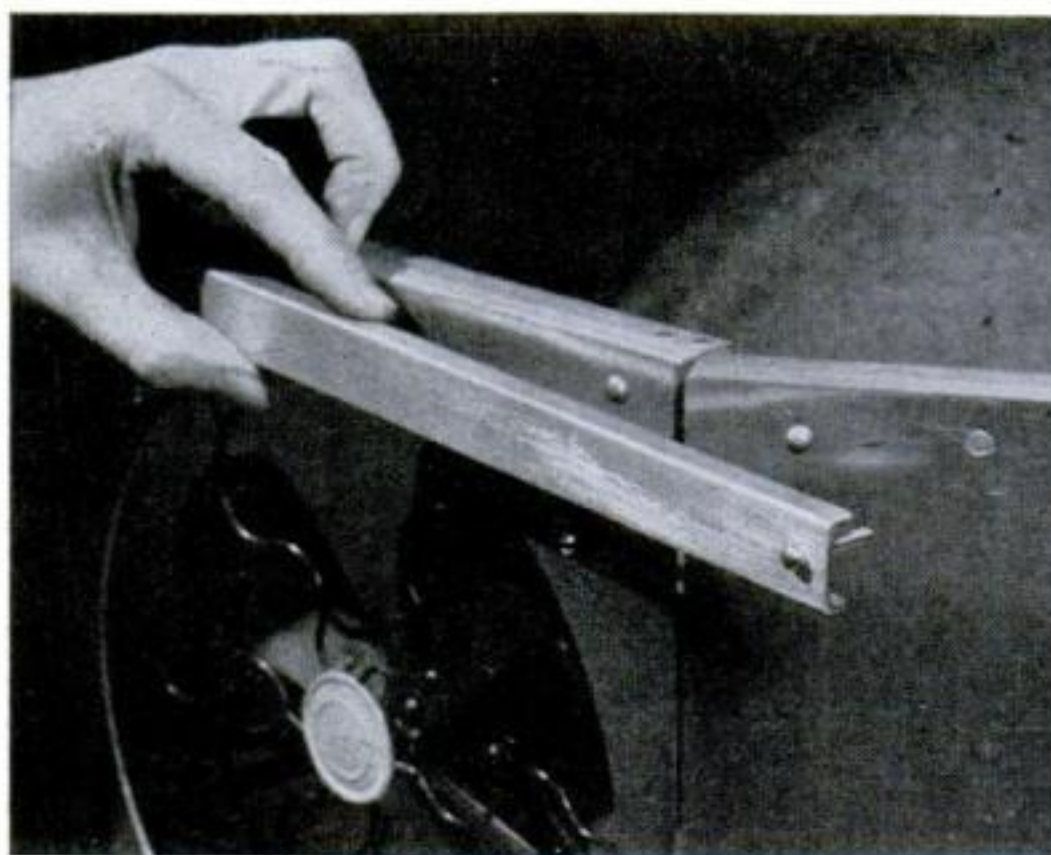
around to draw in outside air directly. Such a fan will be useful in a living room, bedroom, and kitchen; and it'll also be handy in the darkroom or workshop, especially during dusty operations or while painting.

The little window ventilator shown was built around a standard 9" table fan of long previous service. It's designed in three hinged sections, which makes it easy to install within the sash channel of a window casing.

In working out your dimensions, make the overall length about  $\frac{1}{4}$ " less than the window recess so there'll be clearance for

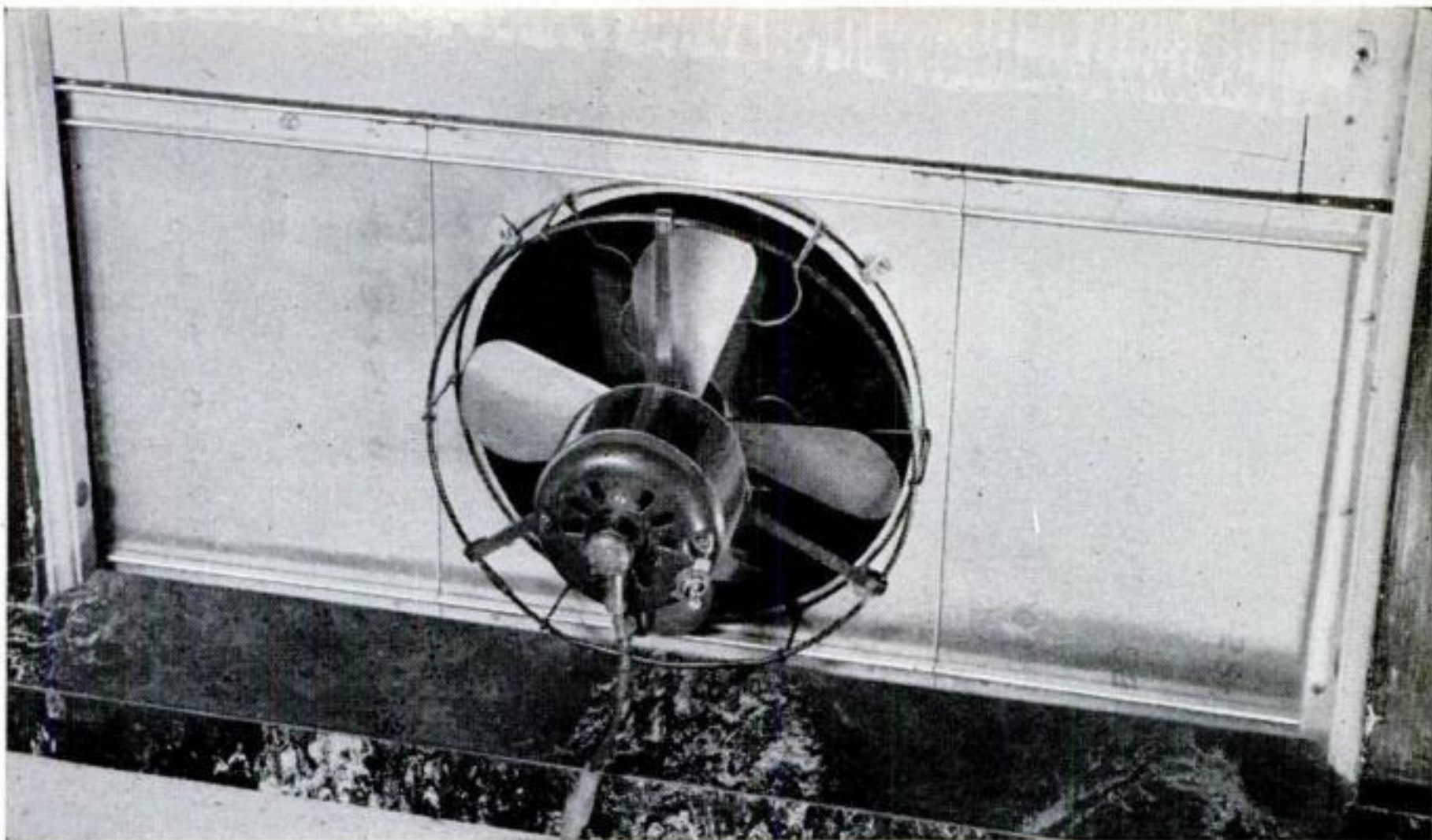


**With wings folded back, this window fan will support itself on a table for use in a room.**



**A length of channel held by wing nuts locks the three dural panels when fan is in a window.**





**Mounted in a window,** this 9" fan sucks out hot air and cooking or painting odors efficiently.

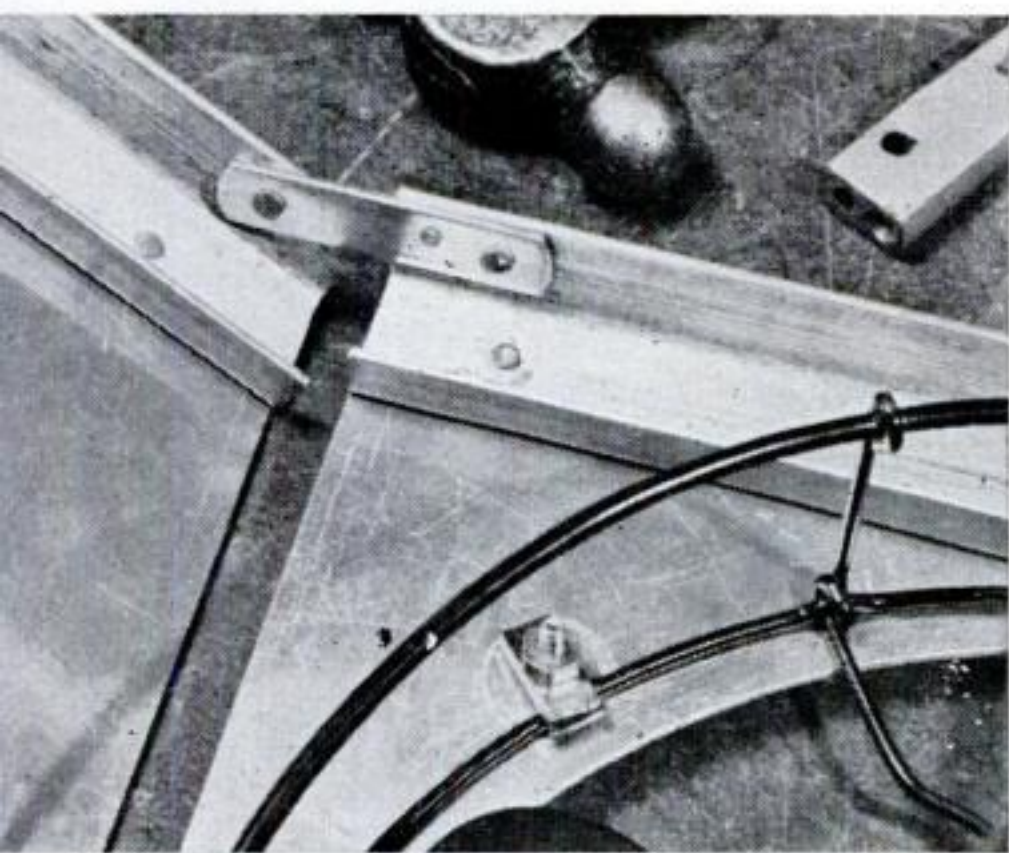
If fitted with light baffles, it would also be handy for ventilating a small photo darkroom.

the wings to straighten. Also allow about  $\frac{1}{4}$ " on each side of the fan opening in the center section, and leave space above and below for the angle or channel. The opening, which can be cut neatly with a metal-working blade in a jigsaw, should be about the same as the fan-blade diameter. Screw-held brass clips hold the guard to the panel; most fan guards are strong enough to support the motor easily. The base is discarded.

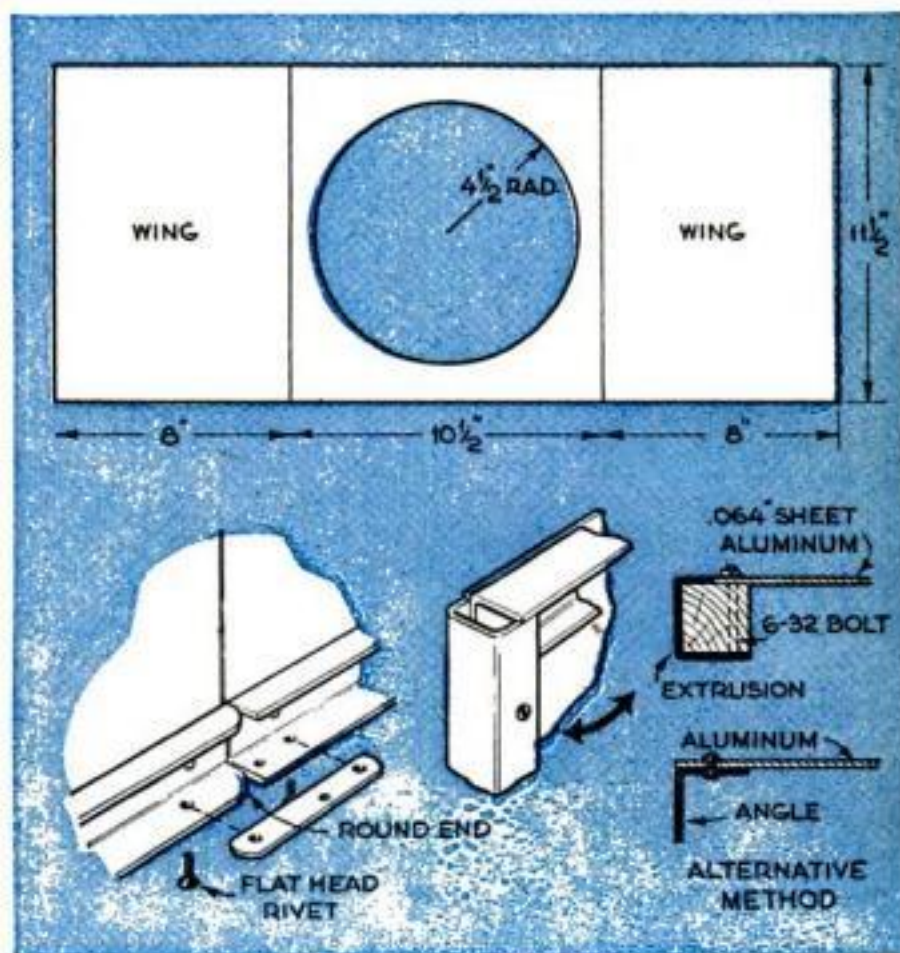
The panels are hinged through brass strips riveted to the channel. Two different

methods of stiffening the ends of the wings, using channel or angle, are detailed in the drawing. A 17" length of channel fitted with a bolt near each end locks the ventilator in a window or with its wings bent.

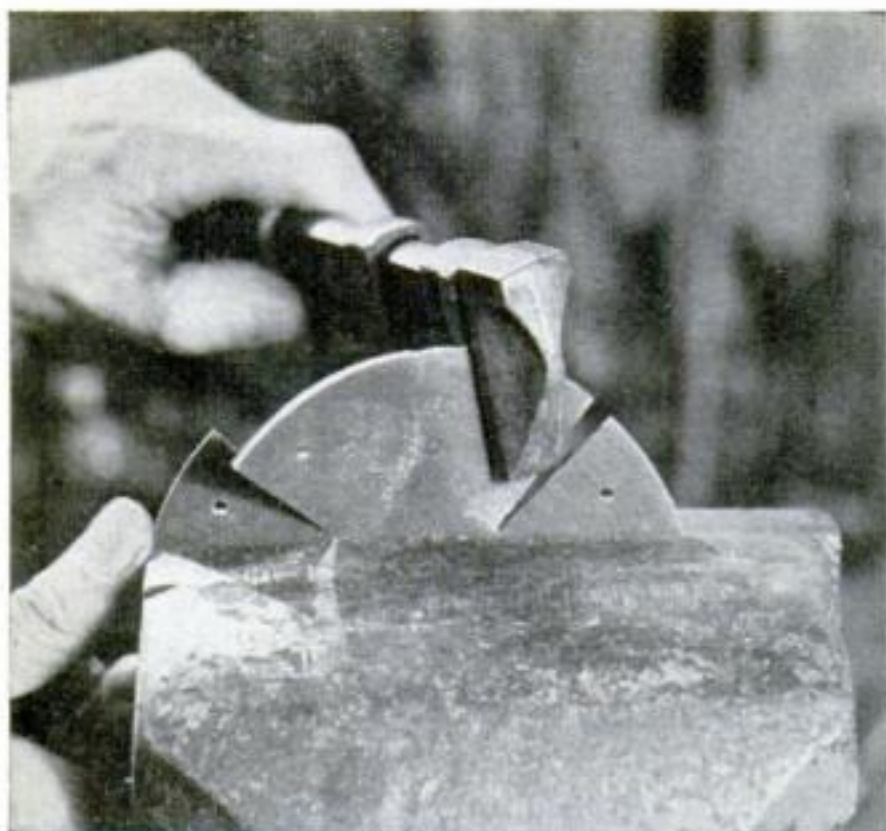
Many variations on this basic ventilator are possible. It could be modified for semi-permanent installation at the top of a window. Or if its chief use is to draw in outside air directly, it could be fitted with a screen or air filter. Locating the blades within a little cowl or tunnel would prob-



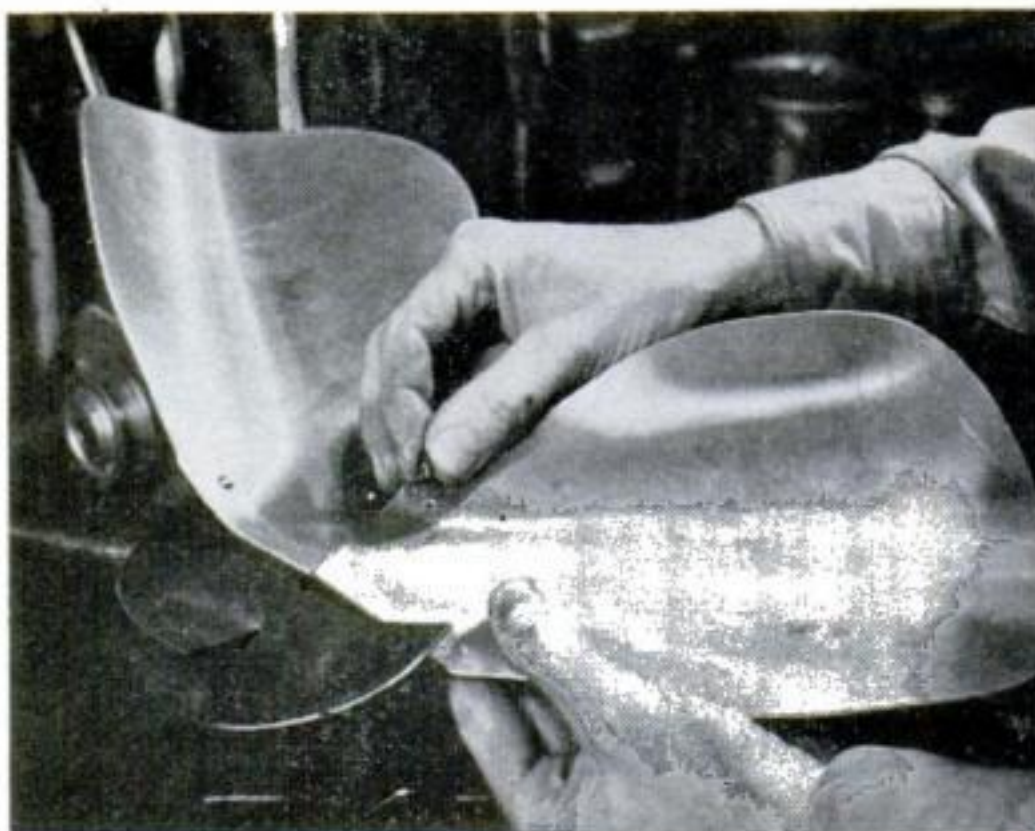
**A brass strip** riveted within the channel takes the hinge pivot. Simple clips hold guard on.







**Bent to give pitch,** a 5" steel disk anchors the blades. It's drilled and slotted before bending.



**Blades of .064" aluminum** are carefully riveted to the disk. Note that the blades are dished.

ably boost efficiency. And rubber mountings would cut noise to a minimum.

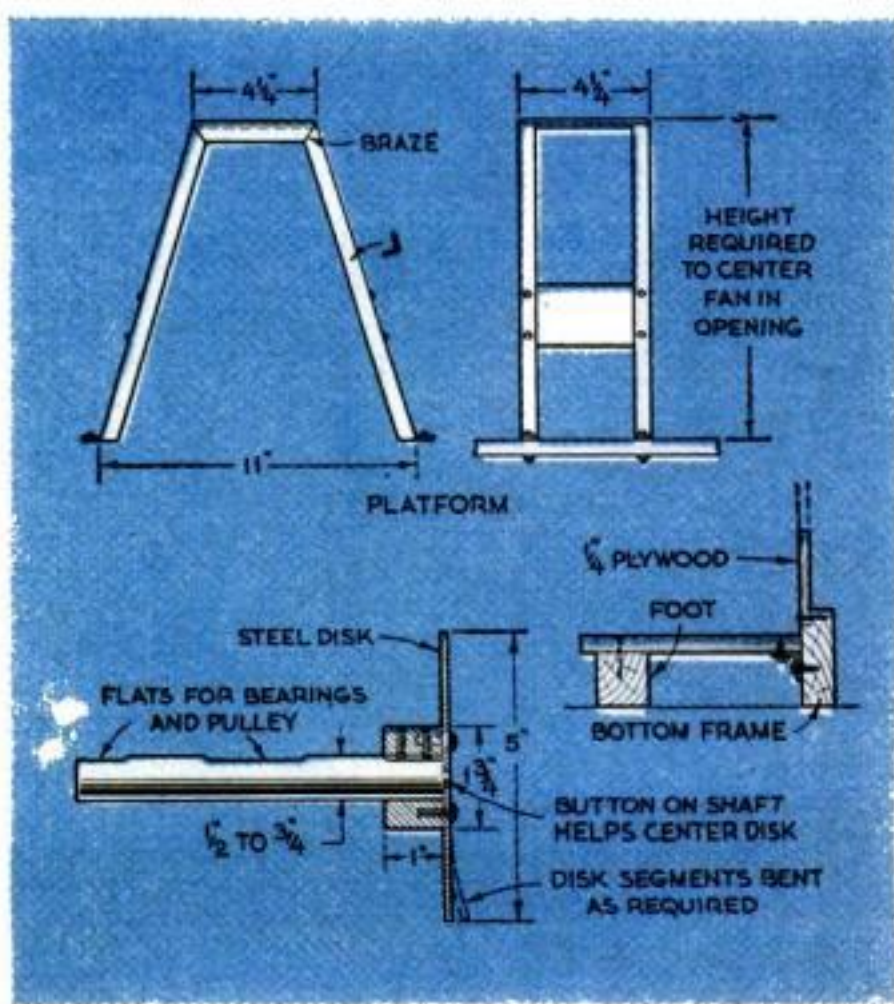
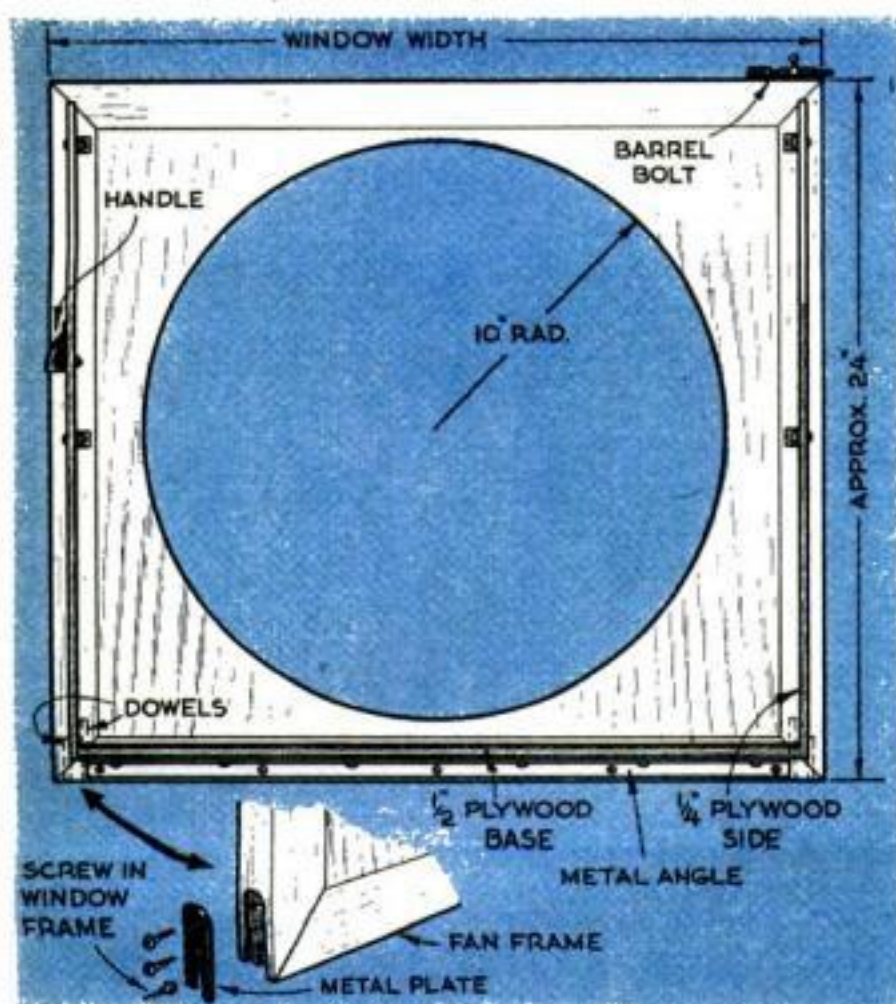
For cooling several rooms or even a small bungalow, the 20" belt-driven fan shown will do a fine job. It's designed to take full advantage of the maximum width of a standard window; and although portable it can be left in place for the season, since it doesn't interfere with the window.

A doveled hardwood framework, built like a sturdy picture frame, is constructed to a size that will just fit within the window casing. Cleats screwed to the casing prevent the frame from touching the sash. Two slotted metal plates engaging screws in the casing hold the bottom in place; and barrel

bolts at the upper corners of the fan enter holes in the casing to secure the top. A rectangle of  $\frac{1}{4}$ " plywood with a 20" opening fits a rabbet in the frame and is held with glue and nails. A shelf at the bottom takes the motor and fan platform, while plywood sidepieces support a guard of  $\frac{1}{2}$ " hardware cloth.

Mounted on a platform of bent and brazed steel angle, the fan shaft runs in a pair of ball bearings. Those shown, found in a surplus outlet at about \$5 a pair, take a  $\frac{3}{4}$ " shaft; but a  $\frac{1}{2}$ " shaft would do as well.

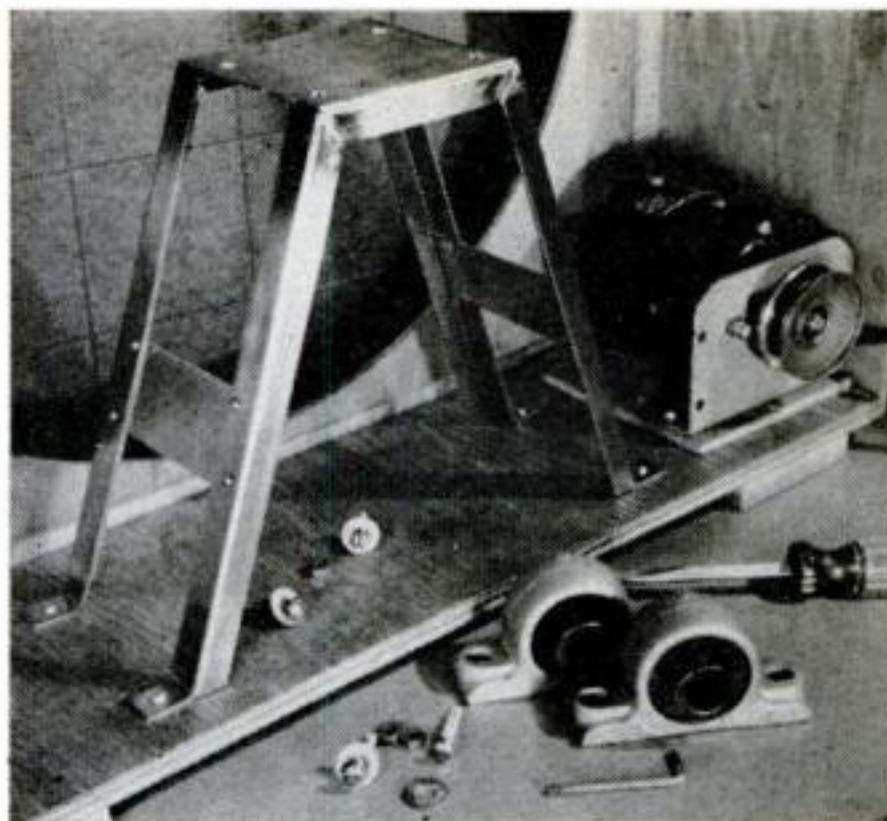
The fan blade proper can be purchased in a supply house, but isn't difficult to make if you have metal-working equipment. To







**Doweled, glued joints** secure the mitered hardwood frame, which is rabbeted for the plywood.



**Light steel angle**, bent and brazed, provides a strong platform without obstructing air flow.

duplicate it, cut a stiff steel disk 5" across and scribe two diameters at 90 deg. Saw in along each line for 1½", drill a center hole and blade-rivet holes, and then bend each segment to an identical angle.

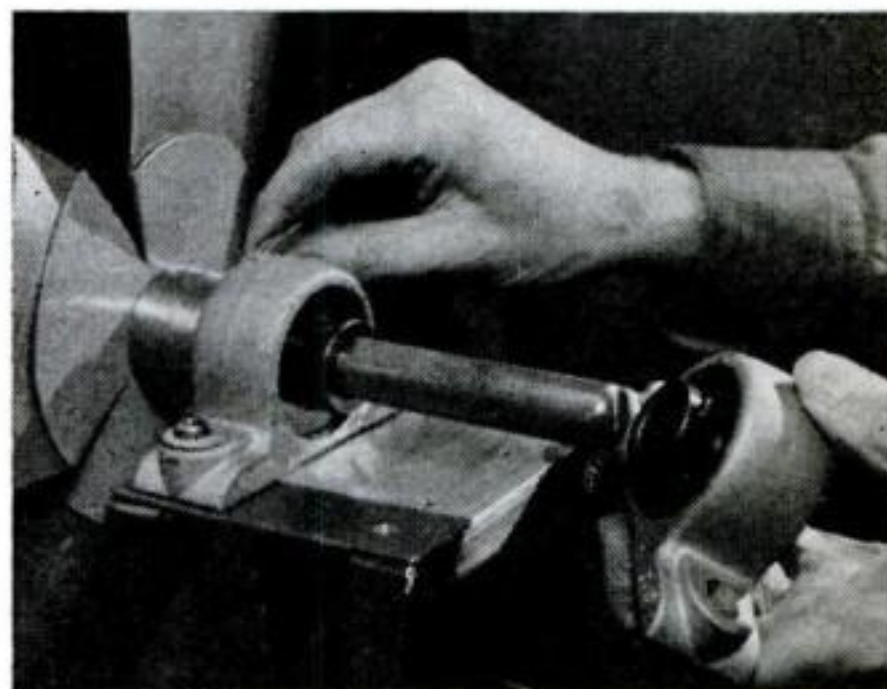
Lay out a heavy-paper pattern for the blades, 10" long, 7" wide, and proportioned like a fat-ended paddle. Cut the four blades of .064" aluminum, taking care to get them identical. Curve each of them as shown in one photo and rivet securely to the disk. For the hub use a lathe turning or a junk-box finding—perhaps a small, trued-up floor flange. Fasten on the blade assembly with steel bolts, using a "pip" turned on the end of the shaft to center the disk.

Revolve the fan slowly by hand, bending the blades so that the same point on each one describes precisely the same circle. Check for static balance by allowing the shaft to revolve on a pair of knife edges, correcting by filing the heavy side.

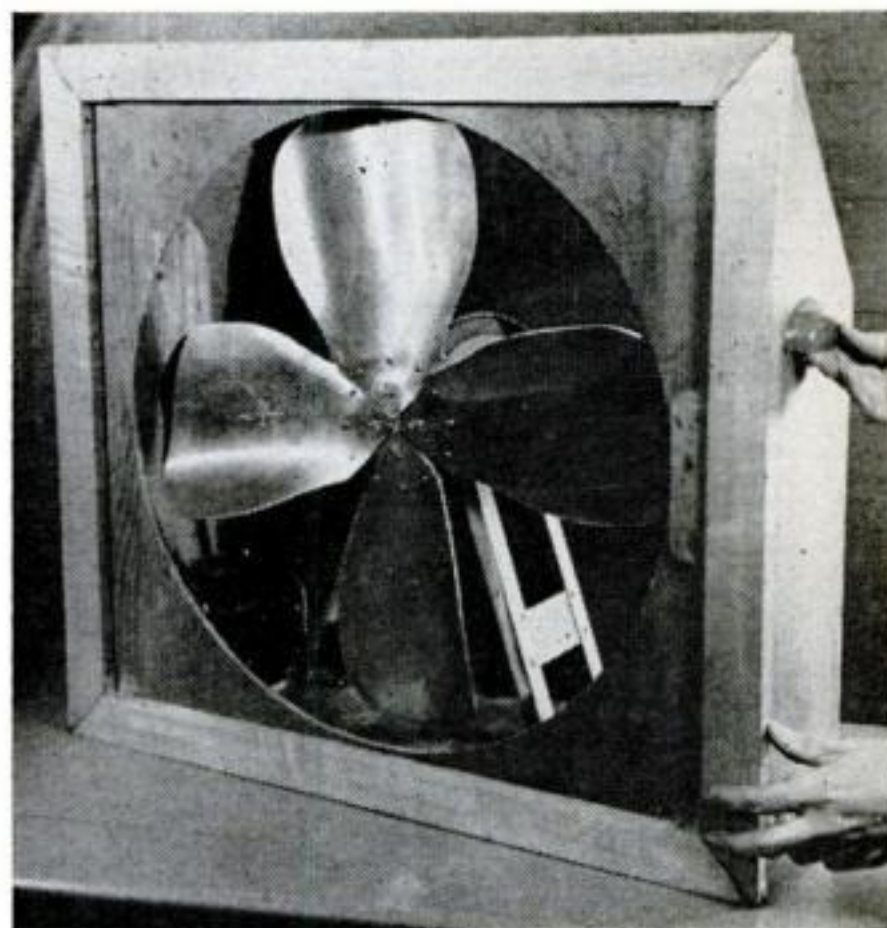
A motor mount slotted for adjusting belt tension is screwed to the shelf, and ½" V-belt pulleys, sized to give a fan speed of about 600 r.p.m., are installed. The motor can be any constant-duty type rated at from 1/20 to 1/10 hp.

For an attic-type exhaust fan, you'll probably want a blade of greater diameter, driven by a 1/6- or ¼-hp. motor at a somewhat slower speed. If the attic is fairly air-tight, especially around the eaves, the fan may be installed in a window or louvered grille. If it isn't tight, this isn't advisable since the fan may suck air in through the eaves rather than up from the lower floors.

In cases like this it's best to put the fan

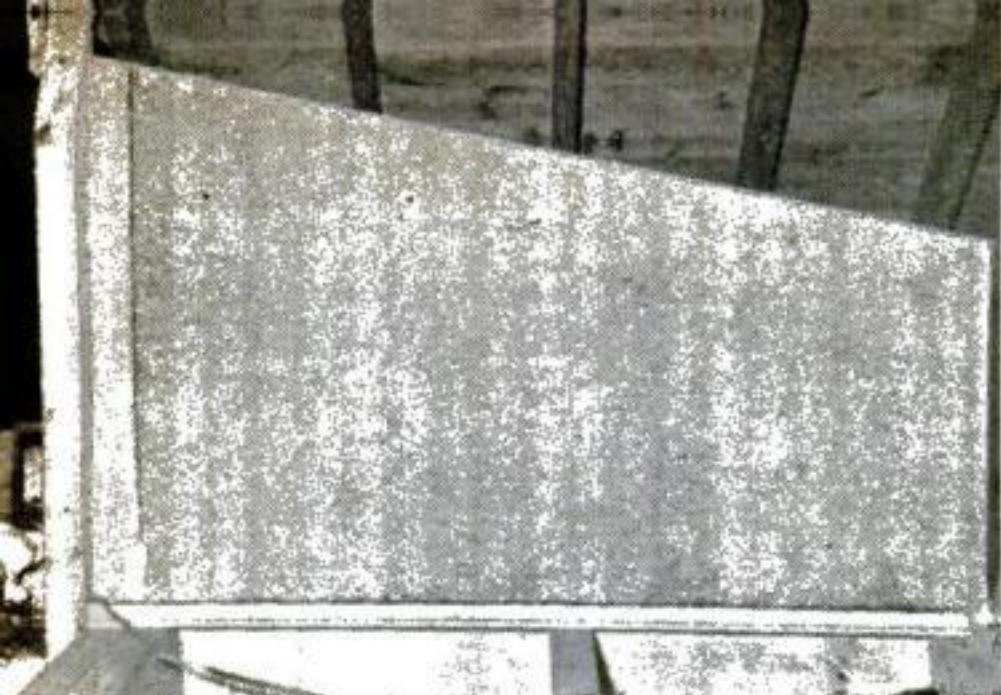


**Ball-bearing pillow blocks** are used. This ¾" shaft is extra husky, but a ½" shaft would do.



**The finished job**, pictured from the discharge side. Hand grips are convenient in moving it.

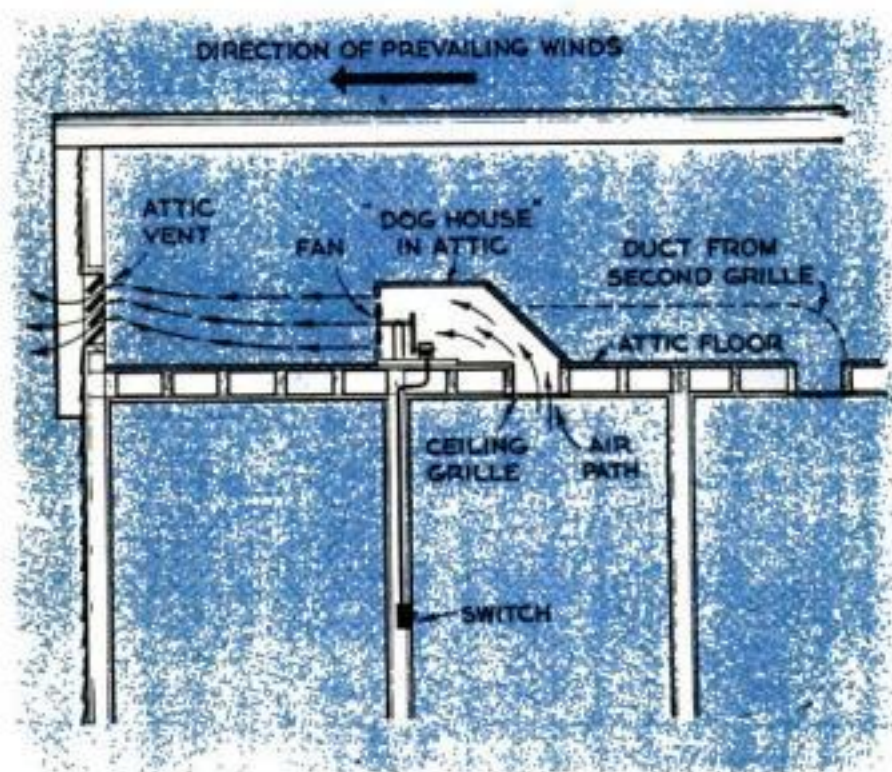




Attic "dog house" built by D. W. Hertel encloses exhaust fan. Its discharge is to the left.



As seen from below, the fan is mounted over an attic hatch in upstairs hallway of Hertel home.



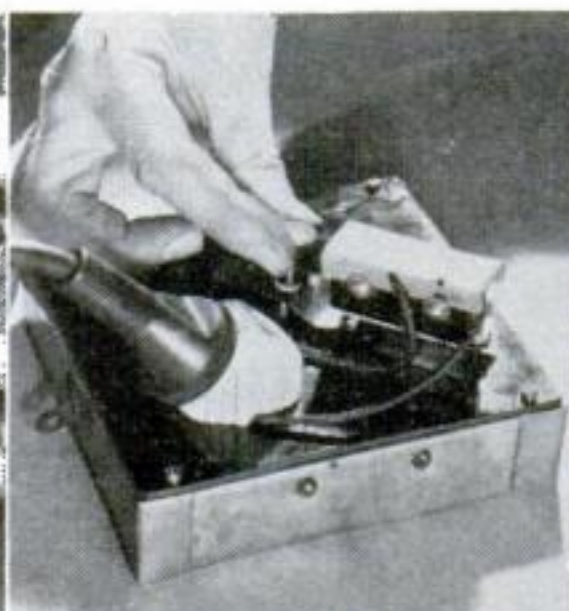
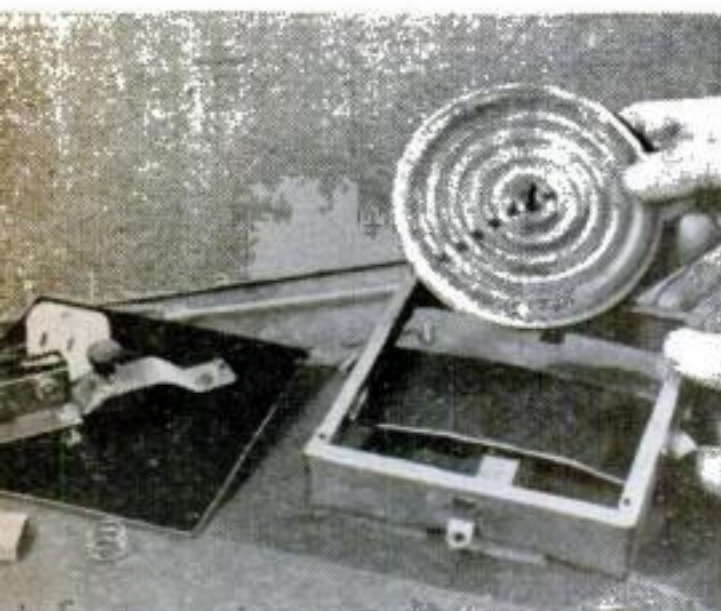
in a "dog house" on the attic floor, discharging toward a window or louvers located downwind of the prevailing wind direction. The intake of the dog house is up through a ceiling grille. Two photos show such an installation built in his home by D. W. Hertel, of Cincinnati.

Attic fans, being designed to draw heated air up from the rooms below and to replace

it with cooler outside air, are generally operated only at night. Therefore, since the fan is often used during sleeping hours, it should be vibration-free. Comparatively low blade speeds are preferable.

Though you can get along with a plain manual switch, automatic controls for an attic fan are a convenience. One method is to use a commercial time switch to turn on the fan an hour or so after sundown and to cut it off late at night. A further refinement is to put a cooling thermostat in the circuit, wiring it so that the fan will run only if the post-sundown temperature is above a set point. The thermostat, which can be homemade or purchased, will stop the fan when the temperature drops below a set point.

If you make your own, an ether-wafer unit of the kind used in poultry incubators will give you a good start. Mount it in a simple frame with its actuating stud tripping a snap-action switch. Leave a little springiness in the action so as to get a temperature differential at the critical point, or else the fan will start and stop repeatedly near it.—Walter E. Burton, Akron, Ohio.



Automatic controls increase the usefulness of exhaust fans. Disassembled at left is a homemade thermostat built around an ether wafer of

the type used to control poultry-brooder heat. Center picture shows it assembled. At right, a time switch that will control fan's operation.

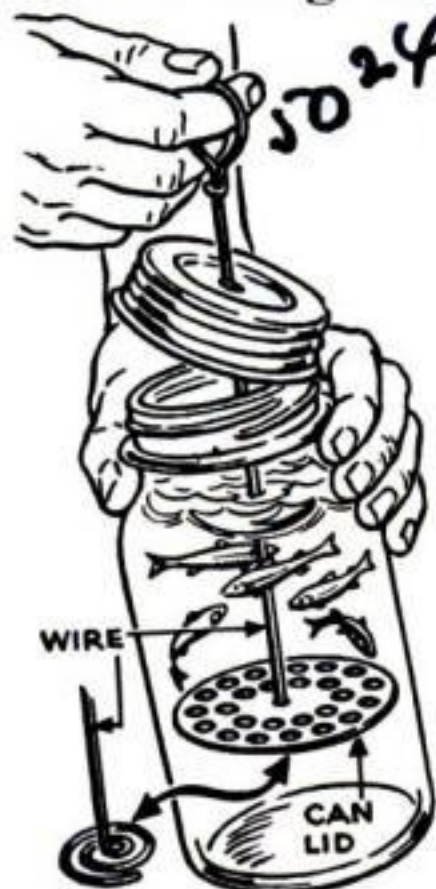




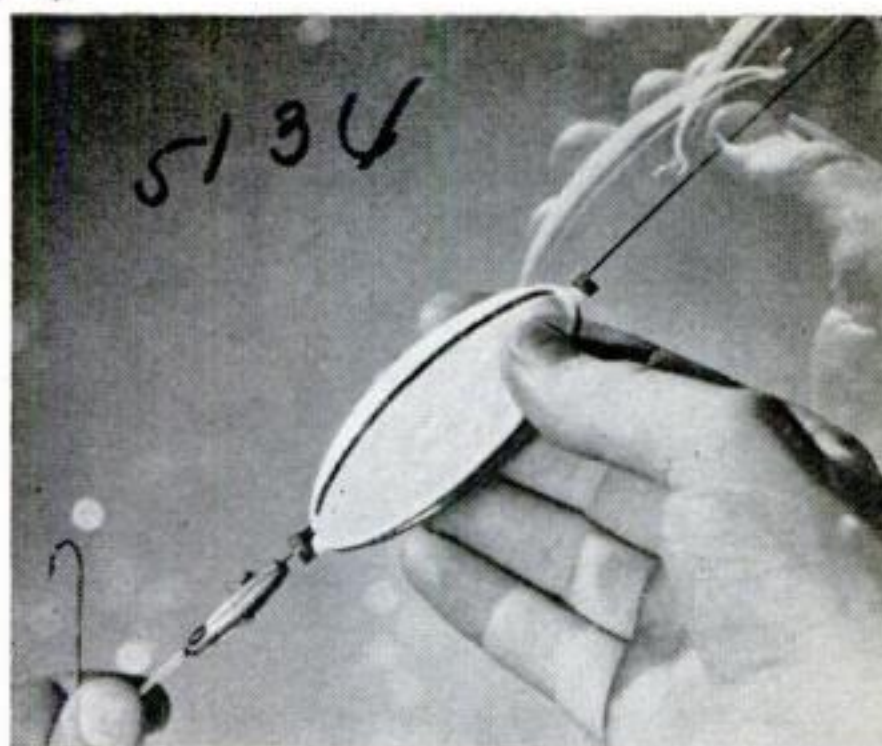
### Water Toy Amuses Child

HERE is an action toy, operated by dripping water, to keep your baby contented in the bath. The duck can be made of light sheet metal, acetate film, or 1/16" plastic. It's mounted on a wire attached to a vacuum cup. Cut the figure as shown, making certain that the rear of the duck slightly overbalances the front part. Bend the upright piece projecting from the back to line up the two holes for the supporting wire. Give the beak a half twist so it presents a flat surface to the drops of water. Bend a loop in the end of the wire after passing it through the holes, and paint the duck in colors.—*Raymond DeBusk Jr., Muncie, Ind.*

### Wire Brings Live Bait to Hand



IF YOU'VE wasted time and patience retrieving live minnows from a jar, you may want to try this arrangement to bring the small fish within reach. Pass a stiff piece of wire through a perforated can lid and through the top of the jar. Bend the wire beneath the lid as shown and just pull it up for fresh bait as and when you need it.—*Roland Cueva, New York City.*



### Plastic Bobber Slides on Line

THE line snaps into retaining eyes on each end of this bobber and runs through a deep center groove. This allows the bobber to slide between the sinker and a knot of thread wound around the line, keeping the bait at the proper depth. If the bait hits bottom, the bobber lies on its side. Weighing only 1/8 oz., it is made of corrosion-proof Tenite ® by Namco Manufacturing Co., Minneapolis.

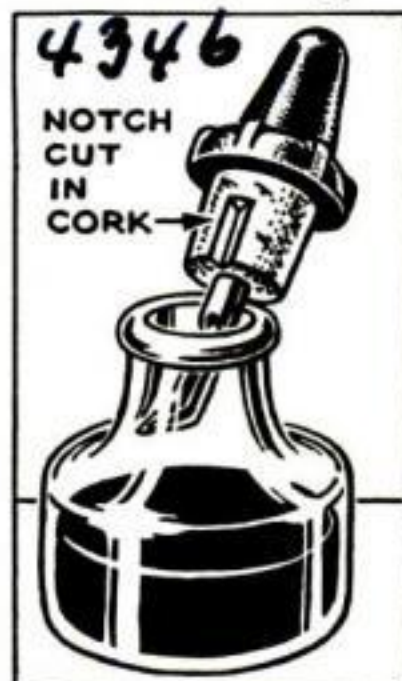
### Sprinkler Reverses Itself

THIS rotary sprinkler is adjustable to cover circles from 15' to 90' in diameter. Pressing a reverse gear and setting the stop also causes it to swing back and forth through any part of a circle. In addition, it may be set to water a long narrow strip. Made by the Double Rotary Sprinkler Co., Kansas City, Mo., it sells for about \$18.



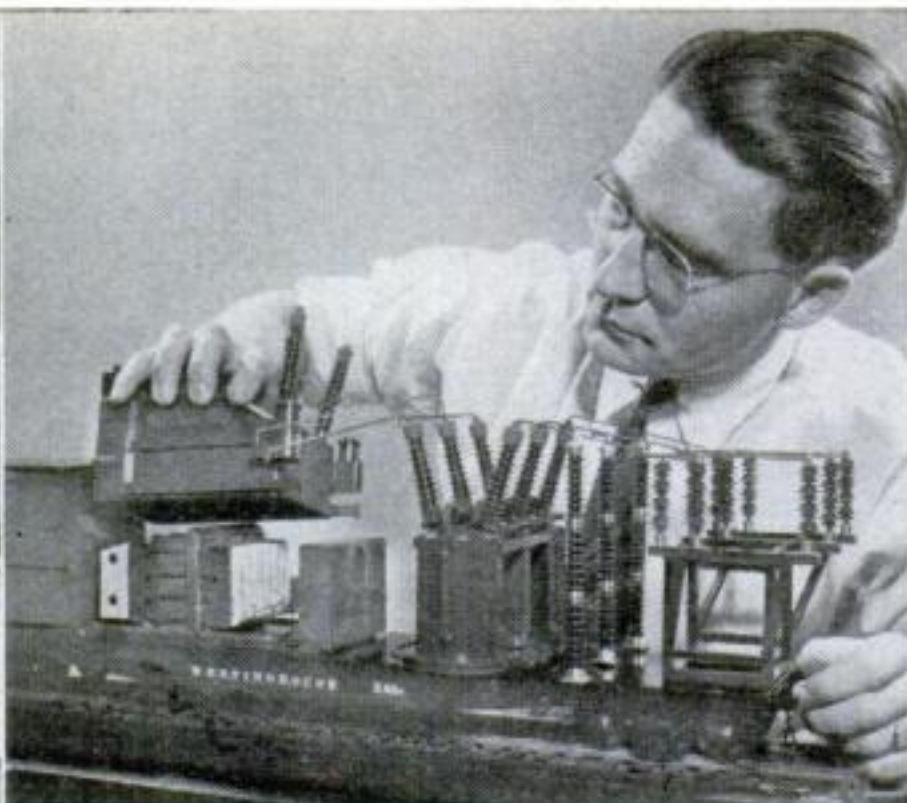
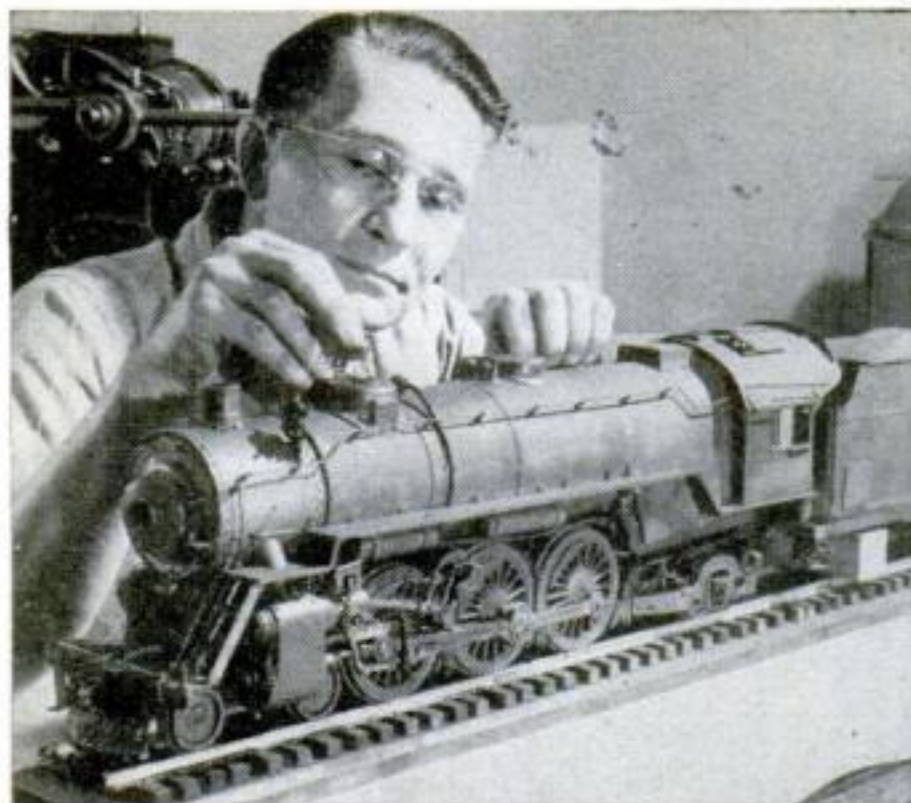
### Notched Cork Lets Air Escape

EVERYONE who uses those small bottles of India ink probably has seen excess air in the bottle push the cork out as soon as it was put in place. A small notch cut in the side of the cork, as shown in the drawing, permits excess air to escape. Thus the cork stays in.—*Raymond E. Haven, Monroe, Ohio.*





5235



## Chiropodist Modelmaker Turns Feet into Inches

FOR a living, Chiropodist Walter J. Teskey, of Pittsburgh, treats ailing feet. For relaxation, he produces working models of various machines, all to exact scale.

Two of his products are seen here. At the left is a model of a Baltimore & Ohio "President" locomotive. The engine and tender contain more than 4,000 parts, most of them machined in Dr. Teskey's tool-jammed home shop. It burns soft coal and gets up 125 lb. of steam.

At the present time, the tender is minus

its wheels and trucks. To save construction time, they were sacrificed to the model at the right—an electrical substation on a railroad car. This model was built on a rush order for the Westinghouse Electric Corporation. It guided engineers in the construction of full-size equipment designed to take power from transmission lines near railroads.

The doctor's latest model is a transformer, also built for Westinghouse. This required about 5,000 separate pieces.

5098



## Just Like Daddy's, Midget Tractor Is Boy's Toy

THIS junior-size tractor, driven by five-year-old Robert Scattini, is of all-welded construction. It was built by the boy's grandfather, J. J. King, of Salinas, Calif. Powered by a small air-cooled engine, it is equipped with a master clutch through

which two belts drive a pair of flat sprockets. Tighteners on the belts act as steering clutches when released by pulling the steering levers. Either track may be locked by a foot-operated drag brake. The disk harrow is the type used with small garden tractors.



# Miniature Dinosaur Guards Desk Pen

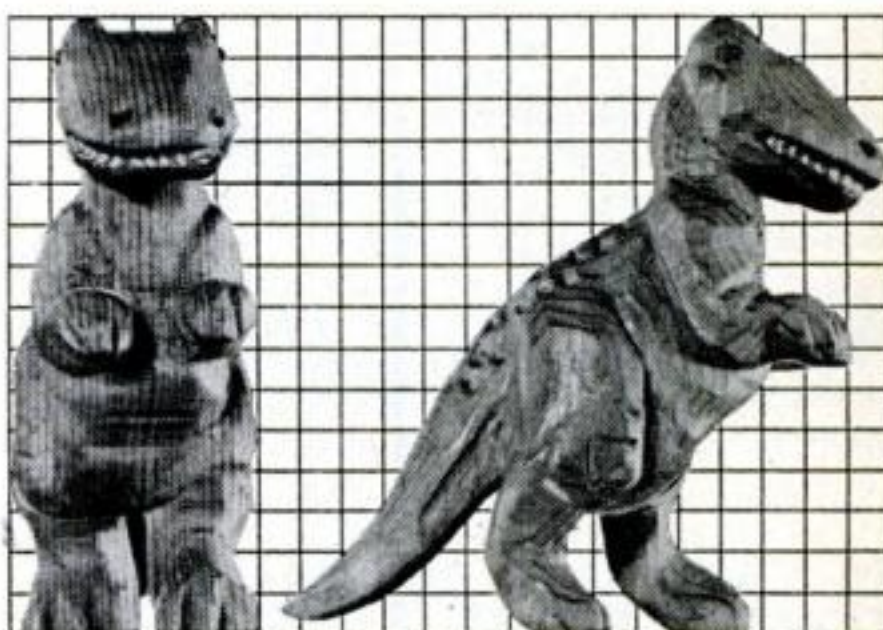
A JUNIOR version of Tyrannosaurus, largest of the flesh-eating dinosaurs, will guard your desk pen. You'll enjoy whittling this prehistoric nightmare down to pipe-dream size.

Lay out the figure on  $\frac{3}{8}$ " squares, using 2" stock. Although any softwood will serve, I find redwood carves easily. Regular carving tools are fine for this job, but even a pen-knife will do. Form the scales on the back with a small gouge if you have one. Sand lightly after carving but don't round off all the cuts.

Tyrannosaurus was a 38' long monster that walked on his huge hind legs. His distinguishing features were massive jaws and teeth nearly a foot long. So lend your carving an authentic and appropriately ferocious touch by emphasizing the teeth with white paint.

Use small, roundheaded tacks or escutcheon pins for the eyes. Set them high upon the head as in the photograph. Paint the lips and nostrils red to add realism.

For the base, use any suitable  $\frac{3}{4}$ " stock. You may want to use a wood that will contrast with the figure. For example, maple will look well with redwood, or a walnut base with pine. It is an irregular oval about 7" long and 4 $\frac{1}{2}$ " wide. Rough-carve the sides as shown. The tree stump is 2" high and 2 $\frac{1}{4}$ " in diameter at the base. First turn or whittle it to its general shape. Then carve the



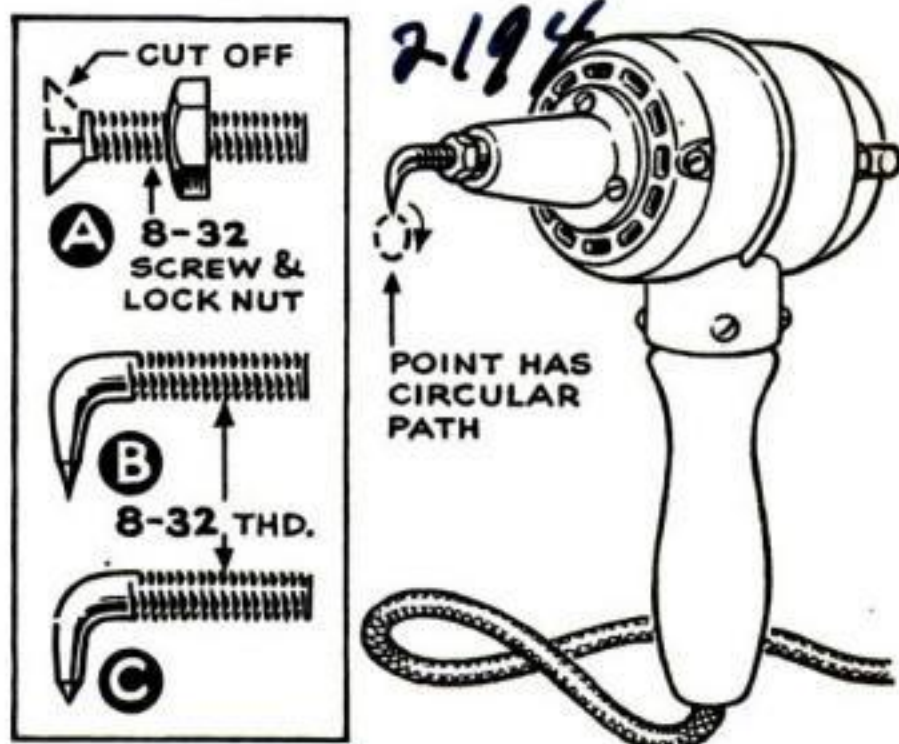
sides to resemble bark. Drill the hole in the top at about a 60-deg. angle.

Darken the top of the base with stain or paint first. Then varnish or shellac all the parts. Fasten Tyrannosaurus and the stump to the base with glue and small screws. The pen is the type that may be bought without a base.—Elma Waltner, Hurley, S. D.

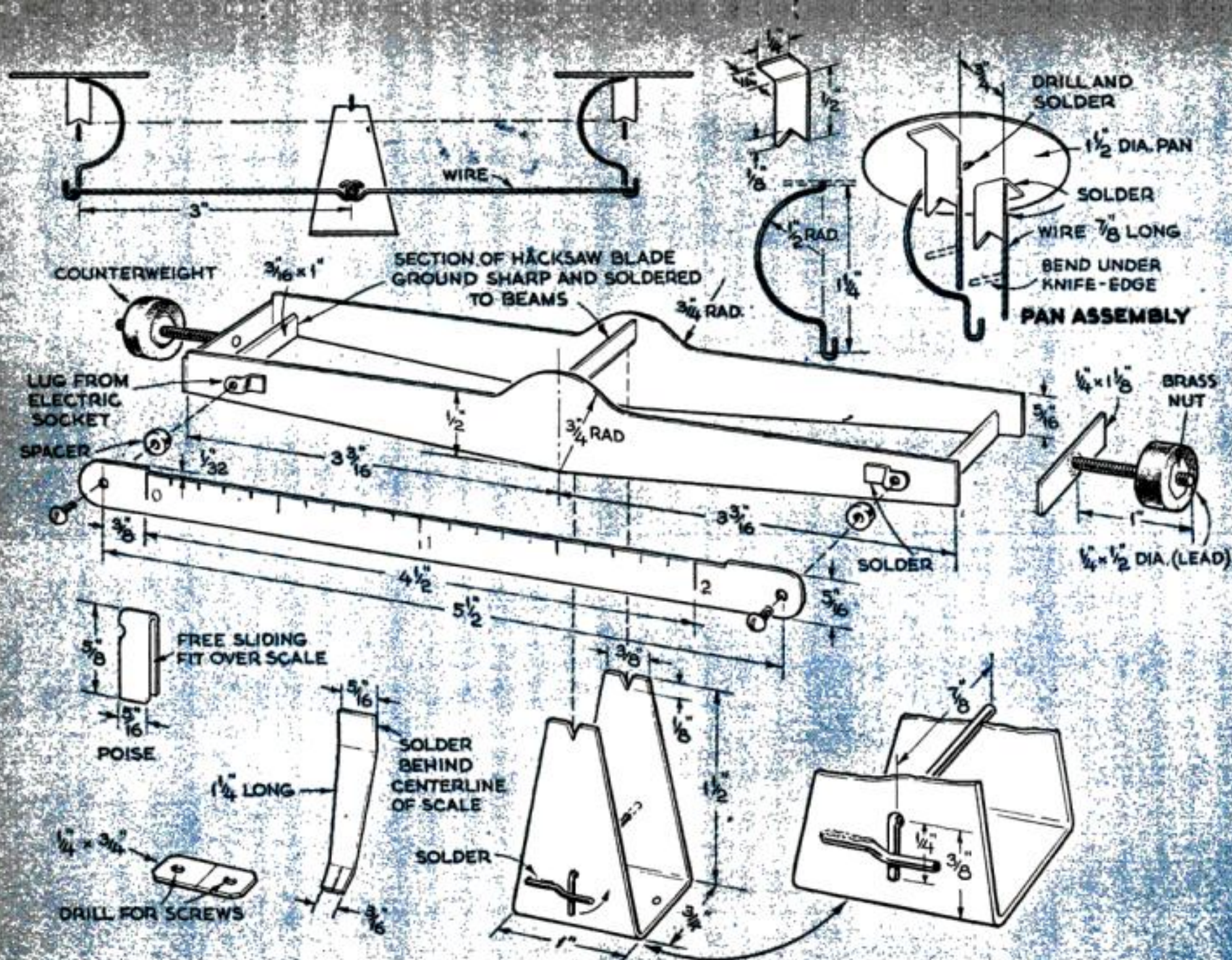
## Vibrator Adapted as Engraver

AN ELECTRIC vibrator that has outlived its original usefulness may be converted to a carving and engraving tool. Remove the rubber vibrator head and replace it with a screw or with a piece of drill rod.

Cut the screw as shown at A for a wood-carving tool. Heat and bend the rod as at B and C for metal or plastic engraving. After grinding the points, harden and temper them. In operation this tool describes a  $\frac{1}{32}$ " circle rather than the linear in-and-out motion of a commercial vibrator-type tool.—Andrew Kovak, Bronx, N. Y.







Sheet brass can be used for most of the parts. File down the top edge of the scale area.

# Balance Tips at Half a Grain

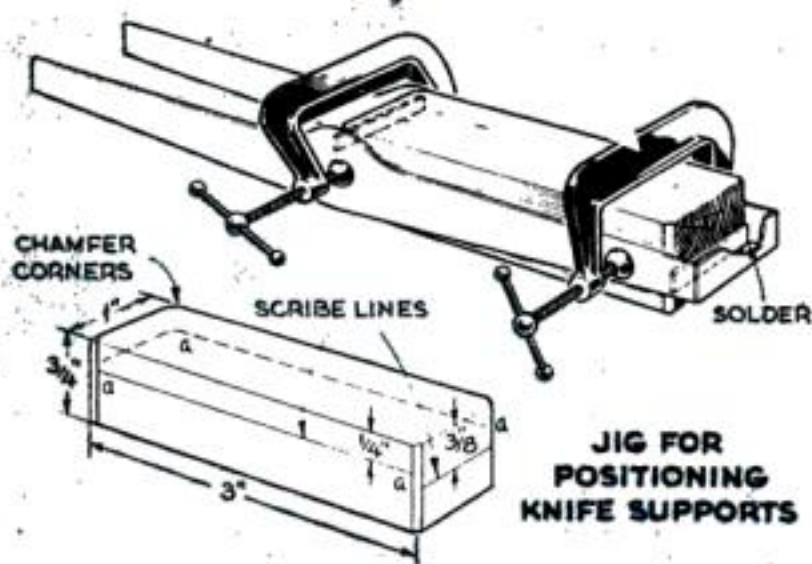
**S**ENSITIVE to  $\frac{1}{2}$  grain and direct reading to .1 gram, this chemical balance is entirely adequate for a home laboratory. Two sets of weights are used—one consisting of 1, 2, 5, 10, and 20 grams; and another of  $\frac{1}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and 1 oz. The beam frame,

scale, stand, pans, pointer, poise, and pan pivots were all shaped from  $\frac{1}{32}$ " brass.

Knife supports were cut to size from an annealed hacksaw blade. The three sections were then retempered and finally ground and honed to a perfect edge. This edge should be smooth and in the center of the blade cross section. Mounting lugs and screws for attaching the scale may be obtained from an old electrical socket. The spacers came from a radio condenser.

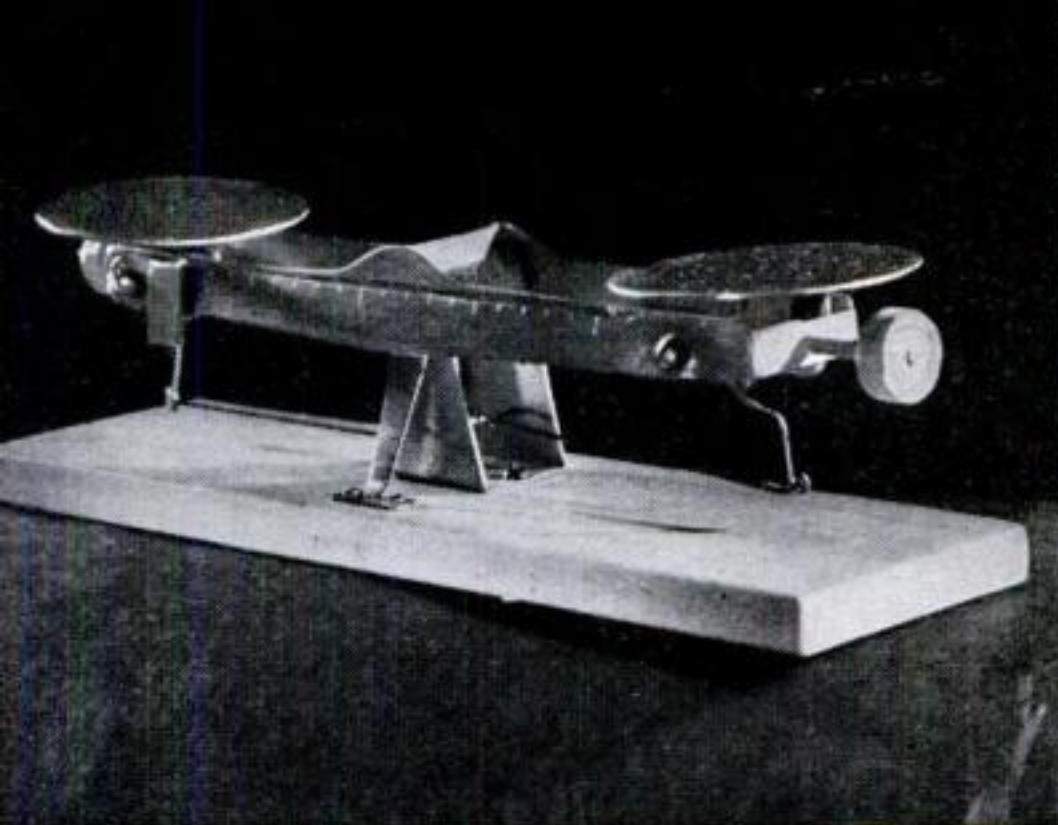
Counterweights were made by threading a tinned brass nut on a brass rod, centering this assembly in a  $\frac{1}{2}$ " hole bored in scrap wood, and pouring in molten lead. The counterweights were then sanded smooth and painted black.

A wood jig,  $\frac{3}{4}$ " by 1" by 3", is required for positioning the knife supports. Assemble so line *a-a* is flush with the top edge and one end at the exact center of the beam. Point

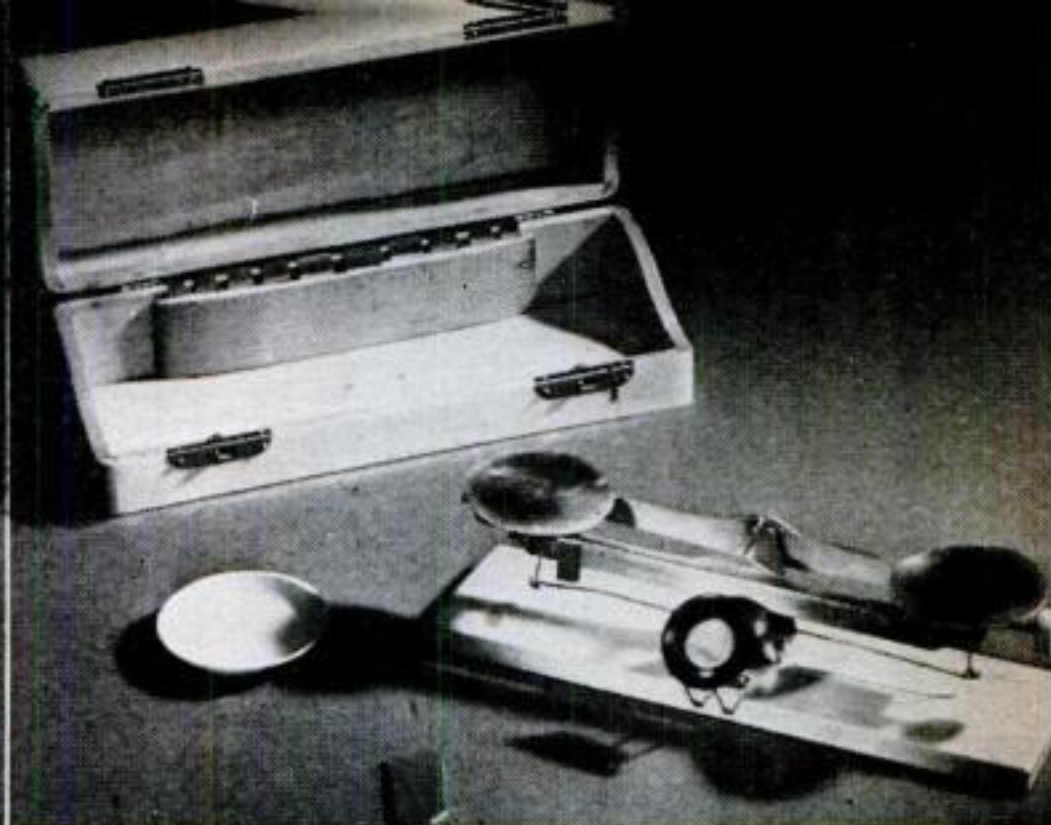


Align the jig so line *a-a* is even with the top of the frame. The middle support points down.





Mount the parts on a base. Place on a level surface when in use. A case (right) is desirable.



A magnifying glass helps bring the scale to exact balance. A wire frame supports the glass.

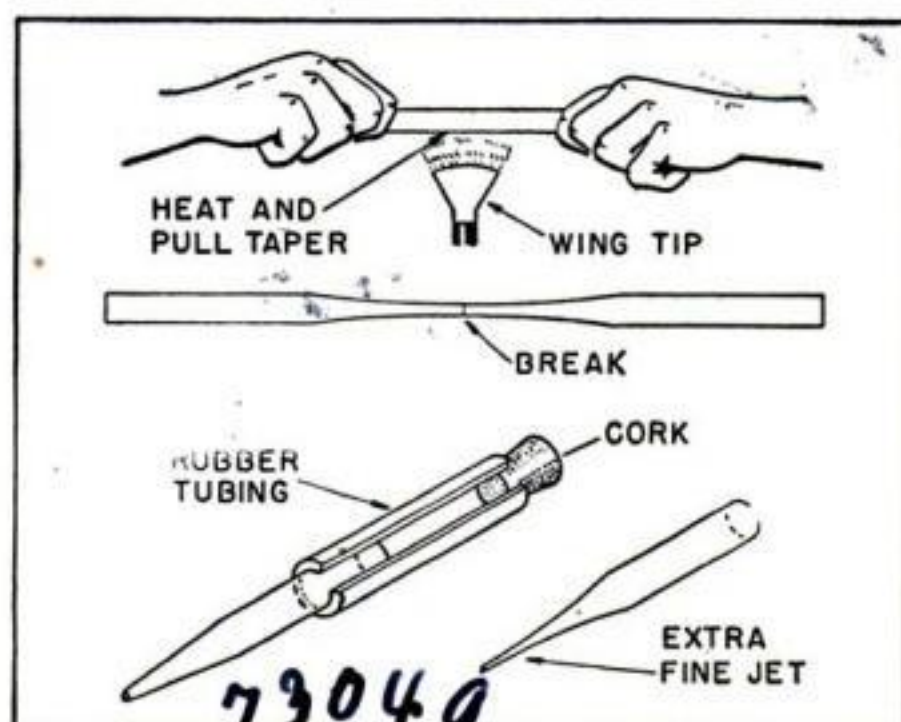
the middle knife down and align the sharp edge with the part of *a-a* carried around the end. Position the end knives with the sharp edge up, even with the  $\frac{3}{8}$ " line.

Screw the scale to a block of wood, exactly parallel to one edge. Then use a square to scribe true lines at both ends of the  $4\frac{1}{2}$ " scale area. Now use dividers, cutting the  $4\frac{1}{2}$ " distance in half and then dividing the halves. Finally, divide each of the four spaces into five equal parts. Each one of the 20 equal spaces then represents .1 gram.

After the scale has been mounted, place it on a level surface. With the poise at zero,

bring the scale to balance with the counterweights. Place a 2-gram weight on the left pan and move the poise to the 2-gram mark. If the pointer is deflected, the poise is heavy. File off a little at the bottom and again start from zero. Continue this try-and-file method until the poise is the correct weight.

Weights were made in this instance by filing down pieces of brass strips until they matched known weights. The brass weights ranged from  $1/16$ " to  $1/4$ " thick. It's easier to make weights of bar solder. You'll also need a shallow pan and a counterweight for it.—J. A. Appelquest, Leonia, N. J.

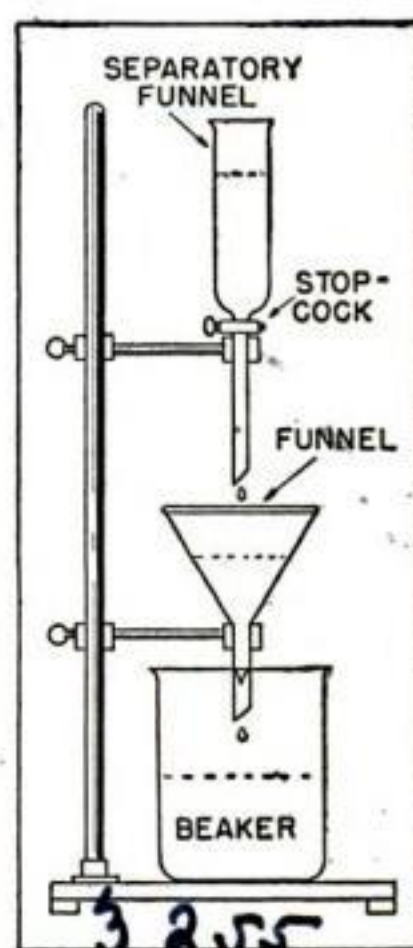


### Droppers Made from Tubing

GLASS and rubber tubing and a suitable cork are all you need to produce a useful laboratory dropper. Heat the glass over a wing top on a Bunsen burner, draw it out, and break off. For a fine jet, draw it almost to a thread.—Jo Ro Jung, New Orleans.

### Second Funnel Saves You Time

Two funnels are better than one when you are filtering a solution in the laboratory. They'll let you save your attention for some other job. Mount a separatory funnel above the regular filtering funnel, as illustrated in the sketch. Fill both funnels with the solution and adjust the stop-cock so that the liquid drops from the top one at the same rate as it leaves the bottom one. This setup filters twice as much per filling as one funnel would.—Kenneth Knauss, Allentown, Pa.







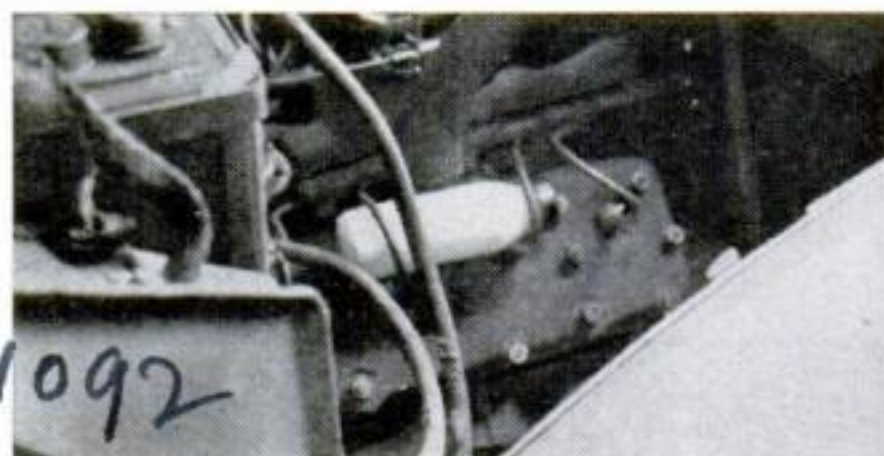
### Paint Holds on Galvanized Iron

SATISFACTORY application of paint to galvanized iron has long been a problem. If the surface isn't prepared first, a reaction is set up that causes the paint to peel. Various treatments have been used from time to time, among them a vinegar wash.

The American Chemical Paint Co., of Ambler, Pa., has now introduced a solution called Lithoform <sup>®</sup> that is said to anchor the paint. Applied with a brush before painting as at left, it forms a stonelike zinc phosphate coating to bond the paint to the metal. In the upper photo, it was used on half the roof. Right half was untreated.

### Car Engine Heats Baby's Bottle

IF YOU travel by automobile with a baby, here's a method of eliminating roadside stops to heat bottles. Use engine heat. The photo shows a bottle slipped under the ignition wires of my car. There's enough tension to keep it there while driving. The milk heats to proper temperature in 20 minutes.—D. E. Zook, Lt. Comdr., U. S. N.



### Wire Holder Protects Bristles



BENT to an L-shape, a piece of wire provides an excellent means of suspending a brush in a tall bottle. It keeps the bristles from resting on the bottom and spreading. No. 9 wire is a good size. Slip the short end into a hole bored in the brush handle. The long leg should extend beyond the bristles.—Benj. Nielsen, Aurora, Neb.

### Beeswax Aids Driving of Nails

I HAD to drive a number of nails and screws into hardwood and, in some places, into knots. More often than not, the nails would bend, and it was almost impossible to drive the screws. Beeswax rubbed on the points helped. A convenient carrier for the wax is a  $\frac{3}{8}$ " hole drilled 2" into the hammer handle.—George J. Polak, San Pedro, Calif.

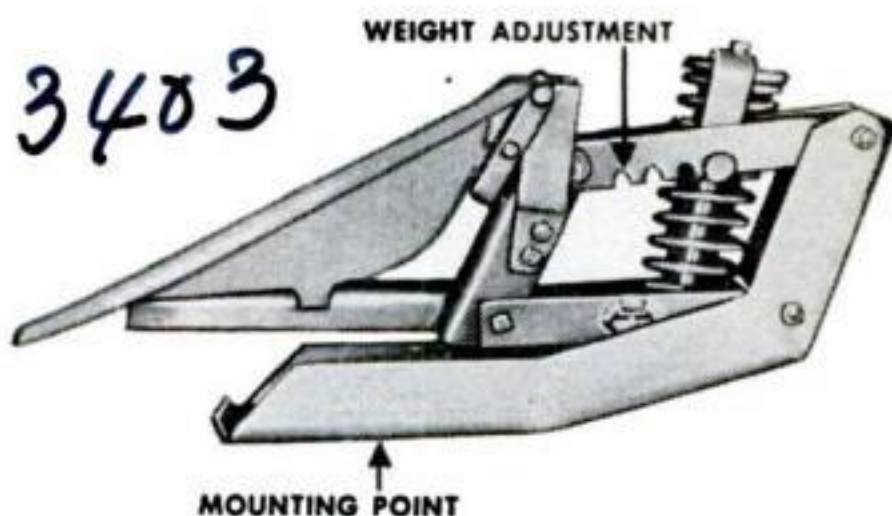






## Hydraulic Tractor Seat Features Weight Adjuster

THIS tractor seat has an airplane-type, hydraulic shock absorber inside the spring to control the action and prevent rebound pitch. The seat is quickly changed to accommodate a 75-lb. boy or a 300-lb. man,



simply by shifting the spring assembly into different notches. This varies the leverage. Easily mounted on any tractor, the seat is produced by Knoedler Manufacturers, of Streator, Ill.

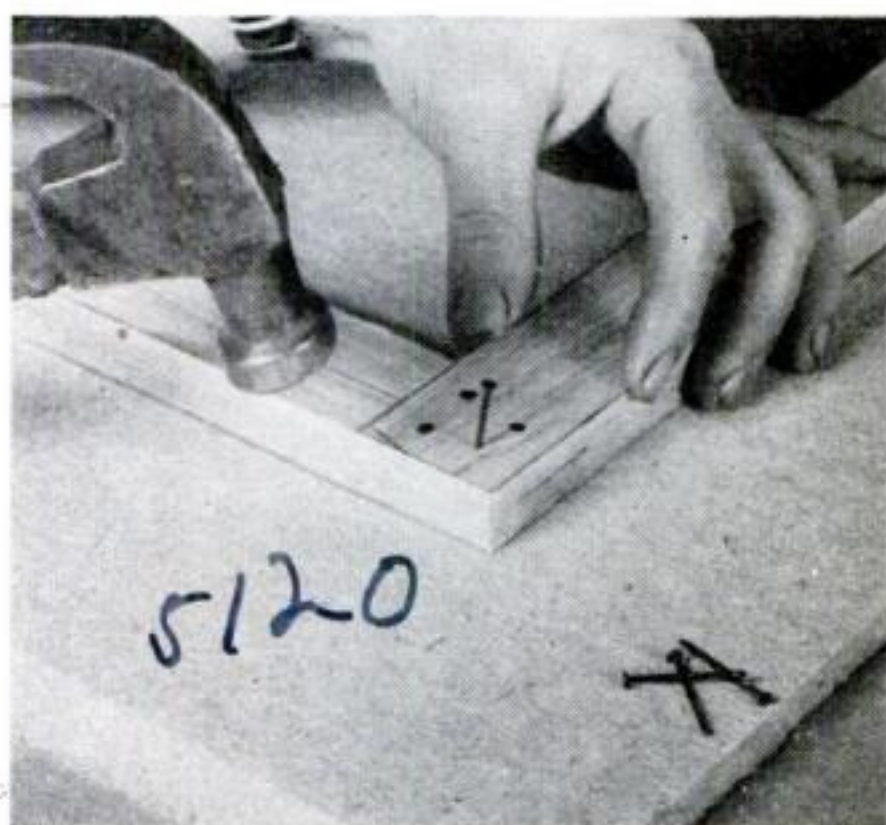
## Can Supports Pot for Painting

WHILE painting a flower pot, you can keep paint off your fingers by pressing the pot down over an ordinary tin can as in the photo at right. Leave the pot on the can to dry. Thus the surface will not be marred by premature handling.



## Milking Stool Also Holds Pail

HERE'S something to keep your cow from kicking over the milk bucket—a combination stool and pail-holder. It was put together with a few boards and a piece of heavy wire. The pail rests on a horizontal member that projects from the solid front leg. Drill holes to take the wire. Then insert wood screws from underneath to meet the wire holes. The screws will hold the wire.—*Marion L. Rhodes, Knightstown, Ind.*

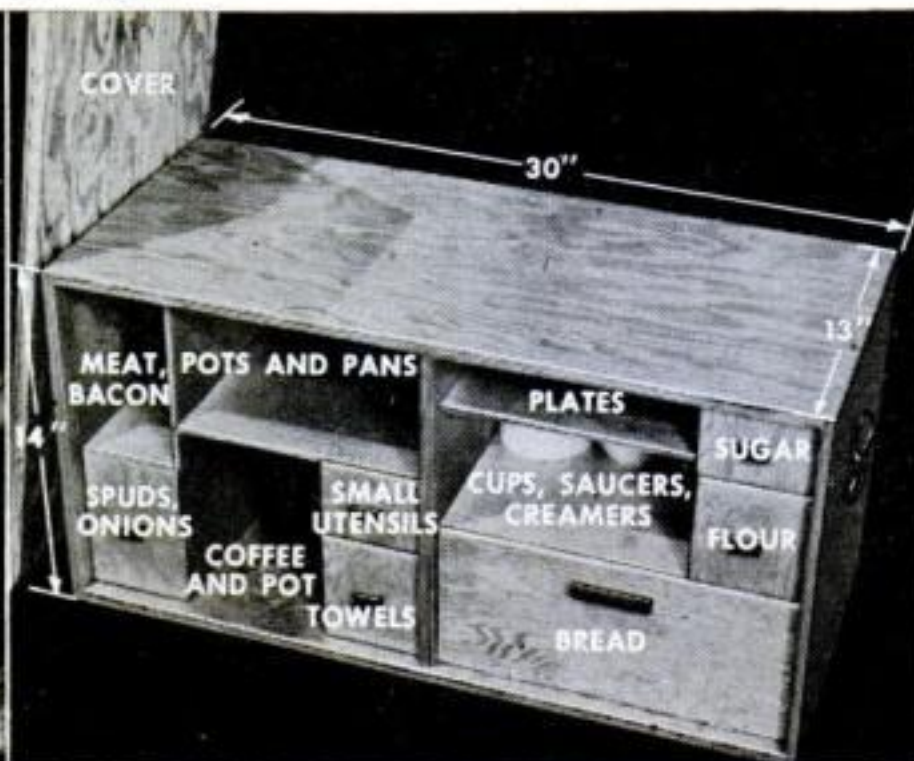
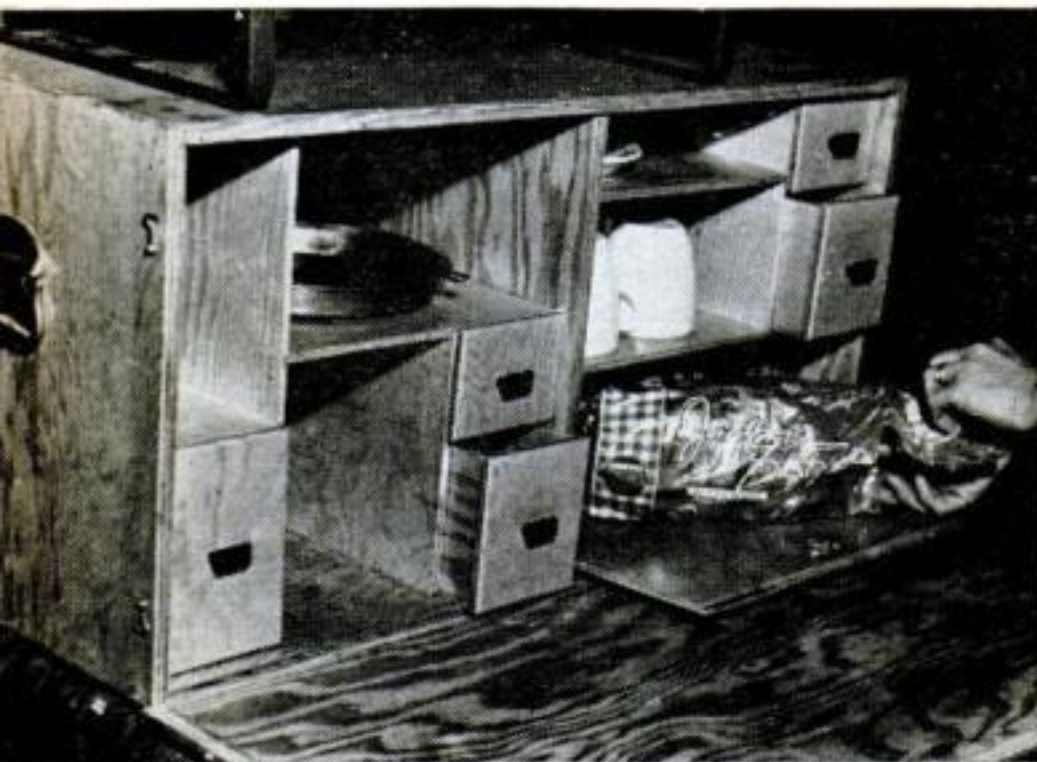


## Insulating Board Saves Bench

WHEN you're assembling material with clinched nails, a sheet of soft insulating board at least  $\frac{1}{2}$ " thick will make the job easier and prevent damage to your workbench. Place the work on the board and drive the nails into it. You can then pry the work from the board, turn it over, and quickly clinch the protruding nails on a metal plate, anvil, or upended flatiron.—*R. O. Lissaman, Brandon, Man.*



3403



## Plywood Kitchen Eases Camp Work

ROADSIDE campers who favor at least a few home comforts will appreciate this compact, all-plywood camp kitchen. It's easily carried in most luggage compartments.

All of the outer faces and the main ver-

tical partition are  $\frac{1}{2}$ " stock. Other parts are of  $\frac{1}{4}$ " plywood. You can tailor the size of the various compartments to your own camping needs. Vertical partitions are dadoed for the horizontal panels, which are staggered to avoid weakening the upright pieces. Double lap joints along the outer edges insure sturdy construction.

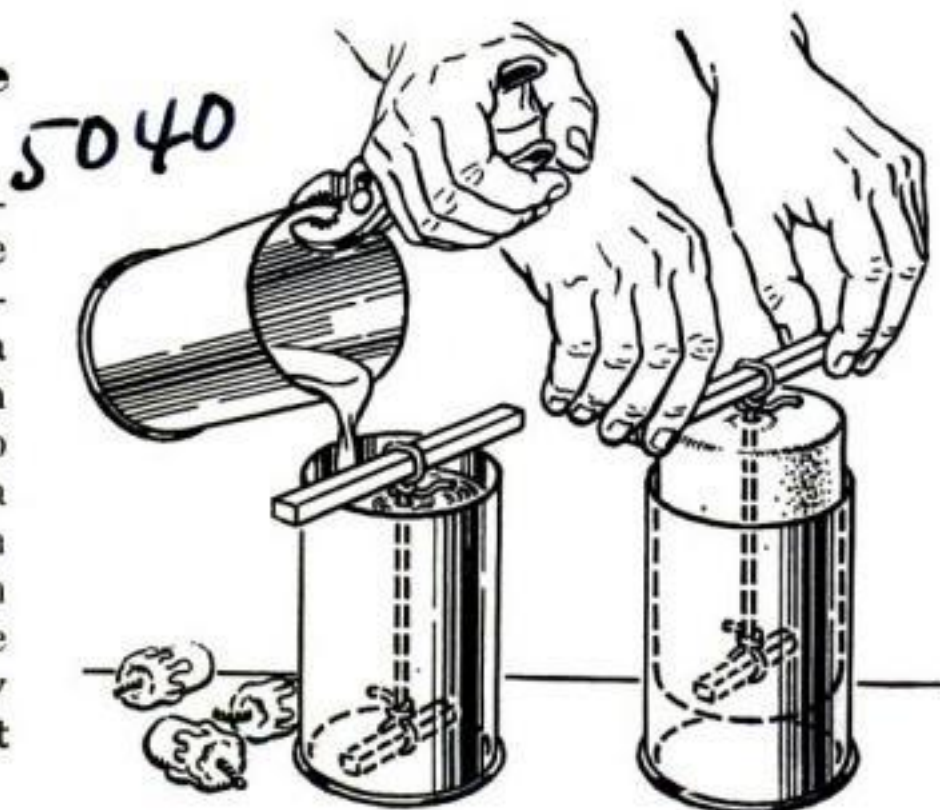
Instead of being hinged in place, the front panel is removable for use as a table top or bread board. When closed, it is held in place by two hooks at each side. Handles are attached at each end and the top will accommodate an average gasoline stove.

The bread compartment at lower right is hinged at the bottom and has a spring-button catch at the top. This compartment is 6" high and 13" wide. Ample provisions for several meals along the road can be stored in the other spaces and drawers. Finish with varnish.—Edward R. Lucas, Poulsbo, Wash.



## Old Candle Stubs Cast to Make Long-Lasting Big Candle

SAVE those burned-down pieces of candles. By remelting them you can make one big, stubby candle for lights-out emergencies or for use in the summer cottage. Tie a big nail to a piece of thick, soft cord, which will serve for the wick. Drop the nail into an empty can, securing the cord with a stick laid across the top. Center the wick in the can. Melt the candle stubs and pour in the wax. When the wax has hardened, the big candle may be pulled from the can by the top stick. If it sticks, dip the can in hot water.—E. Handleman, Portland, Me.







**KODAK FILTERS**  
snap up cloud effects



**KODAK POLA-SCREEN**  
cuts reflected light



**KODAK PORTRA LENSES**  
for magnified close-ups



**KODAK LENS HOOD**  
for side-lighted shots

Give your Pictures  
**PUNCH**  
with Kodak Filters  
and Combination  
Lens  
Attachments

**Easy to use . . . inexpensive**

Why not get in on the fun of making better pictures than the next fellow? It's as simple as one, two, three.

1. Snap the right Kodak attachment on your camera lens
2. Check lens for correct adjustment
3. Trip the shutter for the "best shot in the book"

Ask your Kodak dealer to show you the wide choice of Kodak Filters and Combination Lens Attachments. He also has pocket-size Kodaguides that give correct camera settings for filter and film combinations.

**EASTMAN KODAK CO.**  
Rochester 4, N. Y.

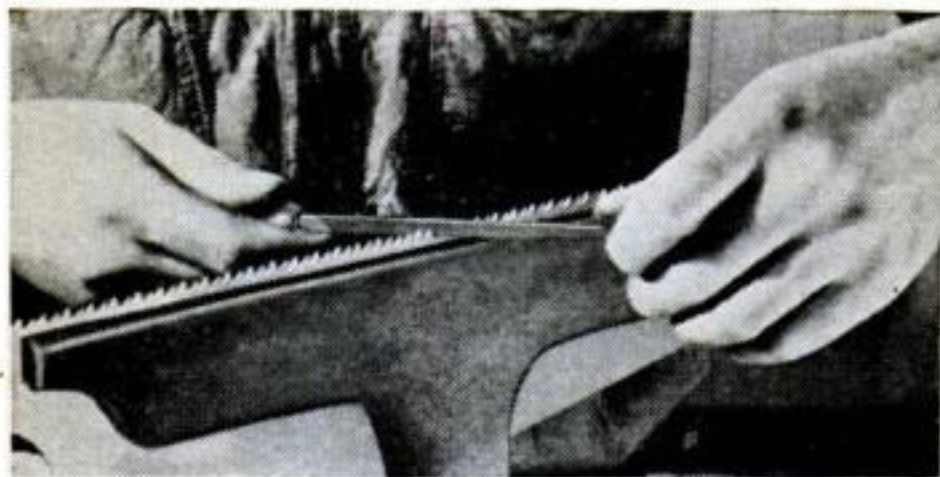
"Kodak" is a trade-mark

**Kodak**



THE RIGHT FILE FOR THE JOB

## is a "must" in saw sharpening



NUMBER OF SAW  
POINTS PER INCH

USE

5	7" REGULAR TAPER
6	7" or 8" SLIM TAPER
7	6" or 7" SLIM TAPER
8	7" EXTRA SLIM TAPER; 6" SLIM TAPER; or 8" DOUBLE EXTRA SLIM TAPER
9	6" EXTRA SLIM TAPER; or 7" DOUBLE EXTRA SLIM TAPER
10	5" or 6" EXTRA SLIM TAPER

In filing a handsaw, two things are important toward making it "zing" through the wood true and fast: The file must be the *right size* and a *good brand*. The table above tells you about the sizes. The trade-marks below tell you the brands widely considered *best in the world*.

Count the teeth per inch in your handsaws, band saws, miter saws; take the table with you to your hardware dealer; ask for Nicholson or Black Diamond brand — and equip yourself with the most efficient saw-sharpening files you've ever used! *Free booklet, "File Philosophy,"* tells about saw filing and about files in general.

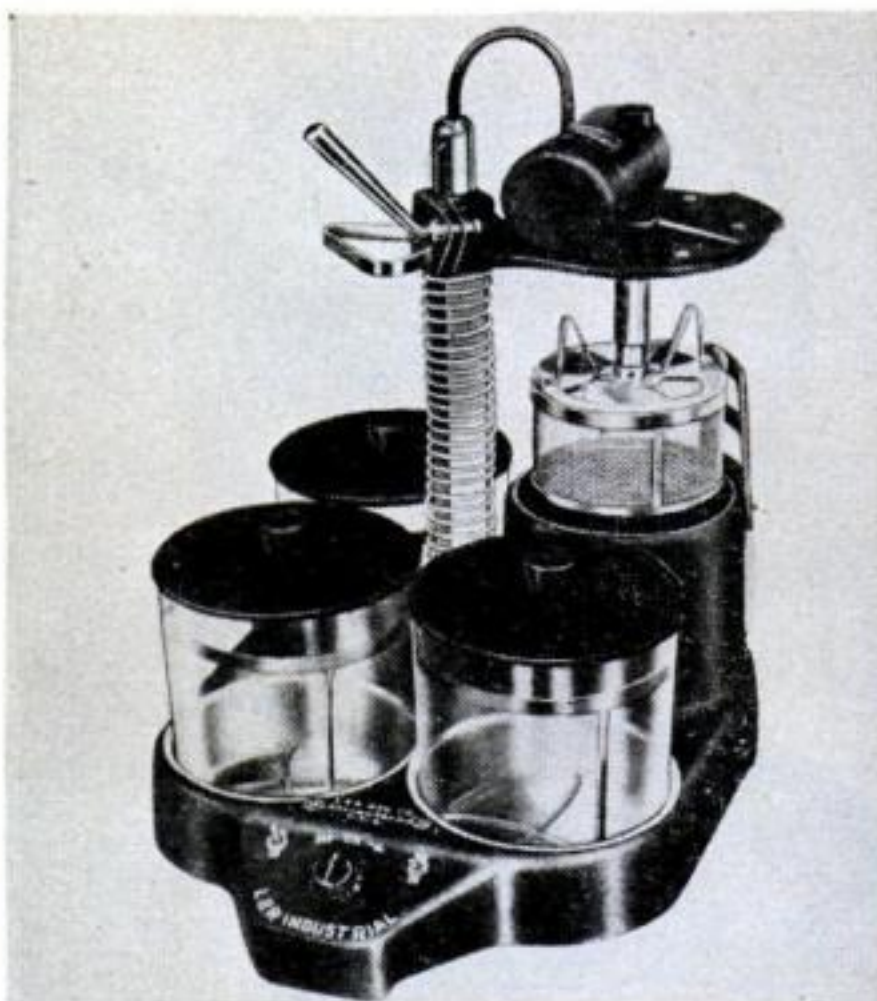


**NICHOLSON FILE COMPANY**  
19 Acorn St., Providence 1, R. I.  
(In Canada, Port Hope, Ont.)



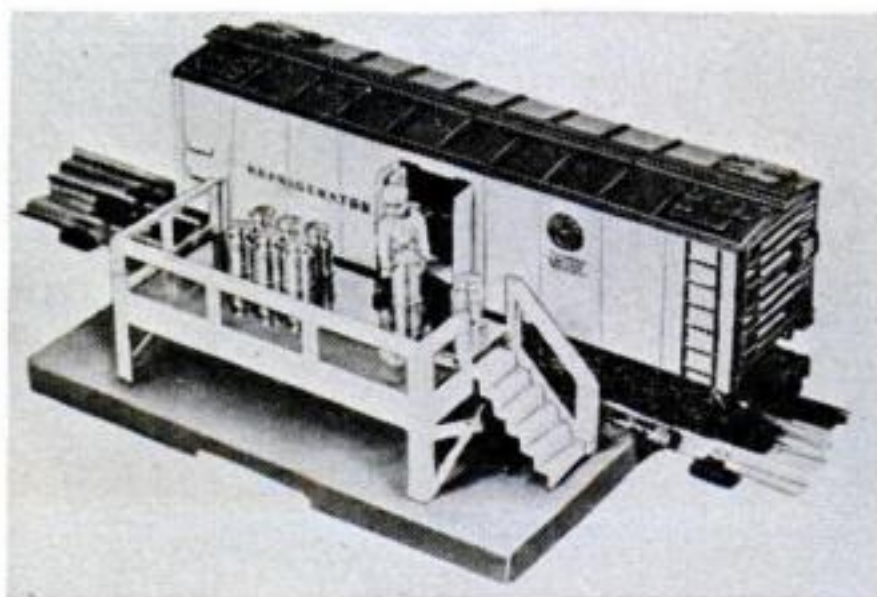
# NICHOLSON FILES

FOR EVERY PURPOSE



## Dunks Small Parts

A SPECIALLY designed motor now gives greater efficiency to this small-parts cleaning machine. Metal parts and instruments that are too delicate to be handled manually are placed in a work basket, shown above, and dunked in each of the jars for cleaning, rinsing, and drying. Three separate sets of parts, held in a triple nesting basket, can be cleaned at one time without the danger of being mixed up. Made by the L & R Manufacturing Co. of Arlington, N. J., the unit is completely self-contained.



## Realistic Toy Milk Car

PRESS a remote-control button and the doors of Lionel's new milk car fly open; then a toy milkman emerges to push eight miniature milk cans onto the platform one by one. The cans are loaded into the top of the car, which can be operated on 0- and 0-27-gauge track.





*Radiator rusted-  
Vacation busted*

*Clean out rust with*

### **DU PONT Cooling System CLEANSER**

Before your engine is ruined by overheating, clean out rust and scum in the radiator. Just pour in a can of DU PONT COOLING SYSTEM CLEANSER, run the engine 30 minutes or more, then drain. No reverse flushing is necessary. It dissolves rust—cleans thoroughly, quickly, and safely.



*Then keep out rust with*

### **DU PONT Acid and Rust INHIBITOR**

After cleaning out the radiator, you can keep it free from rust all season by pouring in a can of DU PONT ACID AND RUST INHIBITOR. This neutralizes the acid and prevents damaging rust from forming.



*Avoid radiator leaks with*

### **DU PONT Cooling System SEALER**

You can stop leaks quickly and securely — and make the cooling system LEAK-PROOF—by pouring in DU PONT COOLING SYSTEM SEALER. It will not clog the radiator or harm hose or metal parts.



**DU PONT**

BETTER THINGS FOR BETTER LIVING  
...THROUGH CHEMISTRY

REG. U.S. PAT. OFF.



# FUSSY FANS

*pleased as punch!*



## UNIVERSAL'S *Cinémaster II*

best buy in home movies... all the film you want right now!

**G**OOD movies all the time make Cinémaster II loads of fun. Easy to load, a pleasure to operate, costs less to use. You'll take movies of your family... vacations... parties, pets and picnics. And there's never a shortage of film — Cinémaster uses all makes of color or black and white including UniveX Single 8 film. At every reliable camera store. *With f3.5 lens, 51.90... f2.5, 66.65... f1.9, 96.75*

UNIVERSAL CAMERA CORPORATION  
New York, Chicago, Hollywood



### UNIVERSAL'S CINÉMATIC

Best buy in 8 mm. home projectors. Quiet; completely gear-driven. Brilliant movies. Extra capacity 400 ft. reels. Coated f1.6 lens... 135.00



### UNIVERSAL'S TONEMASTER

Best buy in 16 mm. sound projectors. Combines 24 features formerly available only at much higher prices. Reel capacity, full hour... 350.00

For Pictures that *Click*...click a **UNIVERSAL**



Fill in cracks, ruts, shallow holes and spreading seams in concrete floors with Smooth-On No. 7B Quick Floor Patch Cement. Made especially for patching concrete. Hardens quickly and stays in place, for it expands slightly as it sets. Buy Smooth-On No. 7B by *name and number* in 1-, 5-, 20- or 100-lb. size. If your hardware store hasn't it, write us.

### FREE Leaflet and Handbook

Leaflet shows how to apply Smooth-On No. 7B. 40-page Smooth-On Handbook describes other Smooth-On Cements and shows many time-saving, money-saving household and auto repairs. Cracks sealed, leaks stopped, loose parts tightened. 170 illustrations. Write for both—free—today.

SMOOTH-ON MFG. CO., Dept. 58G,  
570 Communipaw Ave., Jersey City 4, N. J.



*Do it with*  
**SMOOTH-ON**  
NO. 7B IRON CEMENT



### GERSTNER Tool Chests

Measured by longer service, the cost of genuine Gerstner chests is unimportant. Free catalog.  
**GERSTNER TOOL CHESTS**  
548 Columbia St. Dayton 7, Ohio

### Electrically Welded Endless

## *Paramount*

### BAND SAW BLADES



Made in widths from 1/8" to 1-3/4"

Make your band saw do more work for you. The proper width of blade will extend the scope of this important machine. Burrill's Paramount Blades are made from tough Nickel Alloy Steel properly tempered. Teeth accurately set and filed, and all saws carefully straightened. Send order and check today. Delivery will be made as promptly as conditions permit, from a few days to a week or two. You can obtain these saws at the following prices:

1/8"-3/16"-1/4"-3/8" wide, 5'6" long.....	\$1.04 each
1/8"-3/16"-1/4"-3/8" wide, 6'6" long.....	\$1.16 each
1/8"-3/16"-1/4"-3/8" wide, 7'6" long.....	\$1.27 each

Other sizes at proportional prices

**NO C.O.D. SHIPMENTS ACCEPTED**

State Make of Machine

Your satisfaction is guaranteed

**BURRILL SAW & TOOL WORKS**

405 E. Main St., Ilion, N.Y.



Dependable  
**CHAMPION**

America's Favorite Spark Plug



*Pack a lunch and pile the family into the car, and all out-of-doors is yours to enjoy through the mere turn of an ignition key.*

The key to good ignition and a carefree day is the most dependable spark plug you can buy. Be sure you have dependable Champion Spark Plugs in your engine.

They are the overwhelming choice of such experts as the racing champions of land and water, and are preferred and used by most motorists.

Champion Spark Plug Company, Toledo 1, Ohio.

***FOLLOW THE EXPERTS DEMAND NEW DEPENDABLE CHAMPIONS FOR YOUR CAR***

*Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network*



# Which of these new drills catches your eye?

Which of these slick new hand-drills would you like to have at your work-bench right now? Both have that clean, solid *look* of a good tool that any craftsman recognizes. Hard to choose between them? Why deny yourself either one, when you can own *both* for so little! They're the finest looking drills we've *ever made*, released now to celebrate Millers Falls' 80th Anniversary. At your hardware store.

Machine-cut gears; "Oilite" spindle bearing with ball thrust; true-running 1/4" chuck with 3 hardened jaws. Easy-grip plastic handle holds 8 standard points (1/16" to 11/64").

**Millers Falls  
1/4" HAND DRILL**  
#104 \$5<sup>00</sup>

Slightly higher  
in the west.  
Complete with  
8 drill points.

**Millers Falls  
AUTOMATIC  
DRILL**  
#100 \$3<sup>50</sup>

Slightly higher  
in the west.  
Complete with  
8 drill points.

Exposed metal parts nickel plated steel and buffed aluminum. Right-tension spring gives quick handle return. Eight drill points (1/16" to 11/64") in rugged plastic handle. Dial the drill you want, and out it drops.

## Millers Falls Tools



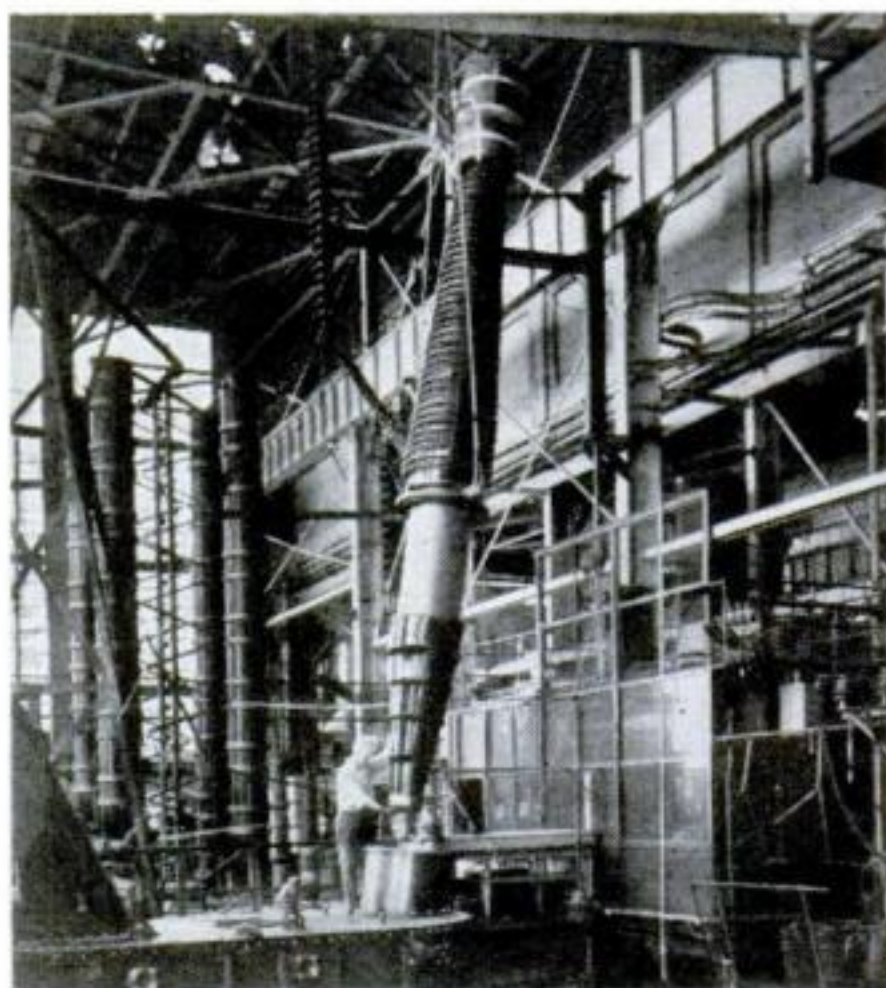
Millers Falls Company • Greenfield, Mass.

**Celebrating 80 Years of Toolmaking**



## Hot Iron Cools Safely

You can store a hot iron in this aluminum, Fiberglass<sup>®</sup>-insulated holder, which attaches to a kitchen wall or door, without danger of scorching the surface on which it is mounted. The iron rests against flanges, which bend so that any type can fit inside. The device is manufactured by Wil-Stan Products, of Akron, Ohio.



## GE Transformer Bushing

THE rocketlike object above is the largest transformer bushing ever built by General Electric. Shown being lowered onto an experimental transformer in the company's Apparatus Works at Pittsfield, Mass., the 26-foot-long bushing and transformer have a rating of 360,000 volts. Hoover Dam's 287,500-volt units were the highest-voltage transformers built at Pittsfield prior to the construction of this new one.



IF YOUR DRILL ACTS LIKE  
THIS... IT'S TIME TO USE  
THE GRINDER. . . AND



IF YOUR CAR FEELS LIKE THIS...  
IT'S TIME FOR MARFAK  
CHASSIS LUBRICATION



THAT CUSHIONY FEELING LASTS LONGER WITH MARFAK!

You want lubrication that does its stuff—not for just a couple of hundred miles—but for 1,000 miles and more. That calls for tougher, longer-lasting *Marfak* Chassis Lubrication. It really sticks to bearings and wear points. You can *feel* it in the cushiony way your car rides and the easy way it handles. Applied by chart, never by chance. Ask your nearby Texaco Dealer, the best friend your car ever had, for *Marfak* Lubrication.



**THE TEXAS COMPANY**  
**TEXACO DEALERS IN ALL 48 STATES**

Tune in: TEXACO STAR THEATER every Wednesday night featuring Gordon MacRae and Evelyn Knight. See newspaper for time and station.





## Fun Spots are Quickly Reached with a HARLEY-DAVIDSON!

Every highway and byway leads to holiday land, every road reveals new pleasures . . . in the world's greatest sport, motorcycling! Go picnicking, vacationing, adventuring, where and when you please! Take in exciting race meets, gypsy tours, hillclimbs, endurance runs! Enjoy the new sense of freedom, the thrilling fun that's always yours whenever you swing into the big, comfortable saddle of a smooth-riding, fleet-footed Harley-Davidson. Owning a world's champion Harley-Davidson is easier than you think. See your dealer today. Mail coupon now.



**HARLEY-DAVIDSON MOTOR COMPANY**  
Dept. PS, Milwaukee 1, Wisconsin

Send free copy of **ENTHUSIAST** magazine filled with motorcycle action pictures and stories; also literature on late models.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

**MENDS**  
BROKEN CHINA, TOYS, ETC.  
It's transparent,  
waterproof,  
flexible and  
durable.

**DU PONT**  
REG. U. S. PAT. OFF.

**DUCO CEMENT**  
REG. U. S. PAT. OFF.

## Genuine Snap-on Tools

Available Only Through Snap-on's  
Direct-To-User Tool Service

WRITE FOR INFORMATION  
SNAP-ON TOOLS CORP. • Kenosha, Wisconsin

**STRIPE WITH PAINT EASY AS USING A PENCIL**

**PAINTERS' STRIPING TOOL**

NOW you can do your own expert striping on furniture, bikes, model planes, bulletins, autos, toys, signs, linoleum, wall board . . . make plain walls look like tile! It's easy to paint straight, curved, circular, even parallel lines with any color. Handiest paint tool in your workshop! Type "M" Master Painters' Striping Tool complete with tip for 1/16" stripe, \$1.00. Extra tips 1/64", 1/32", 3/64", 1/16", 5/64", 3/32", 1/8"—75c each. Tool with complete set of 7 tips \$5.00. (C.O.D. orders 25c extra.) WENDELL MFG. CO., 4234—A Lincoln Ave., Chicago 18, Ill.

**A TOOL... NOT A BRUSH**

**\$1.00 POST PAID**

Dealers Write Today!



# LOOK AT ALL THE JOBS MULTI-TOOL WILL DO FOR YOU

Trade Mark Reg.



A  
CONTINENTAL  
Red Seal  
PRODUCT

Multi-Tool is the portable, self-contained, power source that will drive a wide range of machines and shop tools. Controlled speed range of 100 to nearly 10,000 r.p.m. is available on pulley-and-belt drive, and 1,600 to 2,600 r.p.m. on direct drive. Any machine or tool needing up to 1½ h.p. can be driven by Multi-Tool. Write for literature. See how Multi-Tool will save you time, money, labor.

## FOR A HUNDRED AND ONE JOBS

Simply take Multi-Tool to the job—wherever it is. ONE Multi-Tool will run dozens of different machines—cut equipment costs—eliminate drudgery. Use it for grinding, drilling, sawing, and for running feed grinders, corn shellers, cement mixers, forges and dozens of other uses.

### Portable

Multi-Tool is easily carried. Has easy-grip hand hold at either end.



**IN THE SHOP**  
Drives lathes off belt, run drills off flexible shaft at same time. Special utility base and grinding head available.



**POWERS MANY MACHINES**  
Cement mixers, corn shellers, pumps, and many other farm machines usually run by hand can be easily driven by Multi-Tool.



**STAND BY POWER**  
When line power fails, Multi-Tool can operate generator or can be belt connected to pumps, milking machines, etc.

**FREE  
MAIL  
TODAY**

CONTINENTAL MOTORS CORP.  
MULTI-TOOL DIVISION

620E Ford Building Detroit 26, Mich.

Please send complete, free, Multi-Tool catalog

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

This compact power source is reliable, easy starting, modern in every way. Operates for a few cents an hour. Three-step pulley integral with Multi-Tool automatic transmission.

**SPEED CONTROL.** Fingertip dial permits you to select speed you need for any job, and Multi-Tool will hold to that speed. Automatic transmission permits engine to idle while you change tools or belts.

Up to 1½ h. p., Multi-Tool will do dozens of jobs for you. Get literature today.

DEALER INQUIRIES INVITED

**Continental Motors Corporation**

Multi-Tool Division 620E Ford Building  
DETROIT 26, MICHIGAN



"Company's more fun..."

since Paw glued his chair to the door with Weldwood Glue"

When you want a wood-to-wood bond that will really hold... remember Weldwood Glue. It's quick to mix... easy to use... tremendously strong... stain-free... rot-proof... and permanent. At hardware stores, lumber yards, chain stores, in 15¢, 35¢, 65¢, 95¢ and larger sizes.



**WELDWOOD**  
PLASTIC RESIN GLUE

United States Plywood Corporation, New York 18, N. Y.

JULY 1948 225





**KEEPS COLORS  
FROM FADING!**

**THE SOONER  
YOU SIMONIZ YOUR  
CAR THE BETTER!**



Millions of motorists say ...  
**"YOU SHOULD  
SIMONIZ YOUR  
CAR!"**

**MAKES NEW  
CARS LOOK  
EVEN BRIGHTER!**



**for longer lasting  
beauty and protection!**

Simoniz gives your car gorgeous beauty . . . protects the finish . . . keeps colors from fading. And you can do a professional job—in half the time—without a buffer! For a "quickie slick-up" or to clean your car before applying Simoniz—use Liquid Simoniz Kleener (if the finish is unusually dull, restore the luster with Paste Simoniz Kleener). For lasting beauty—follow up with famous Simoniz!

**THE SIMONIZ COMPANY,  
CHICAGO 16, ILL.**

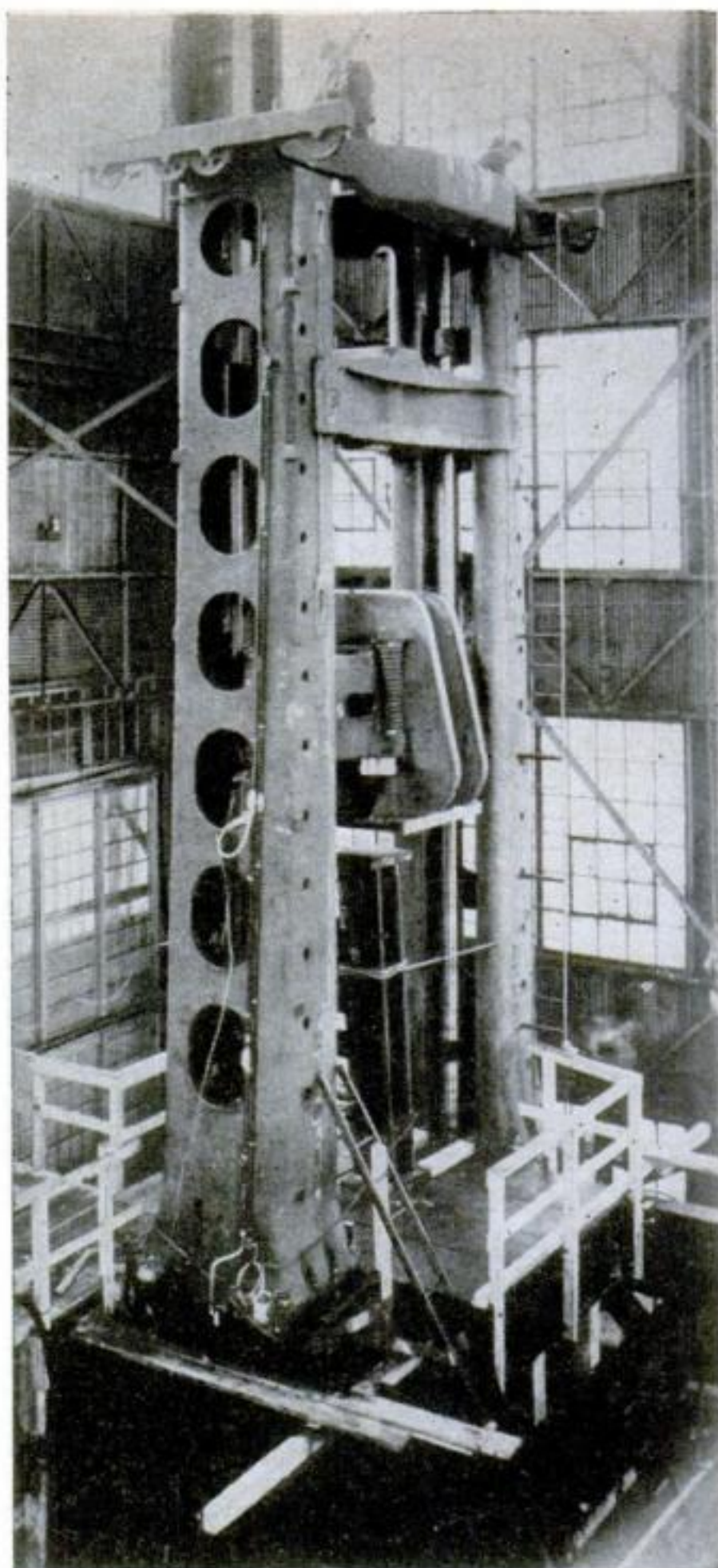


**MOTORISTS WISE**

**SIMONIZ**

TRADE MARK REG.

**MAKES THE FINISH LAST LONGER**



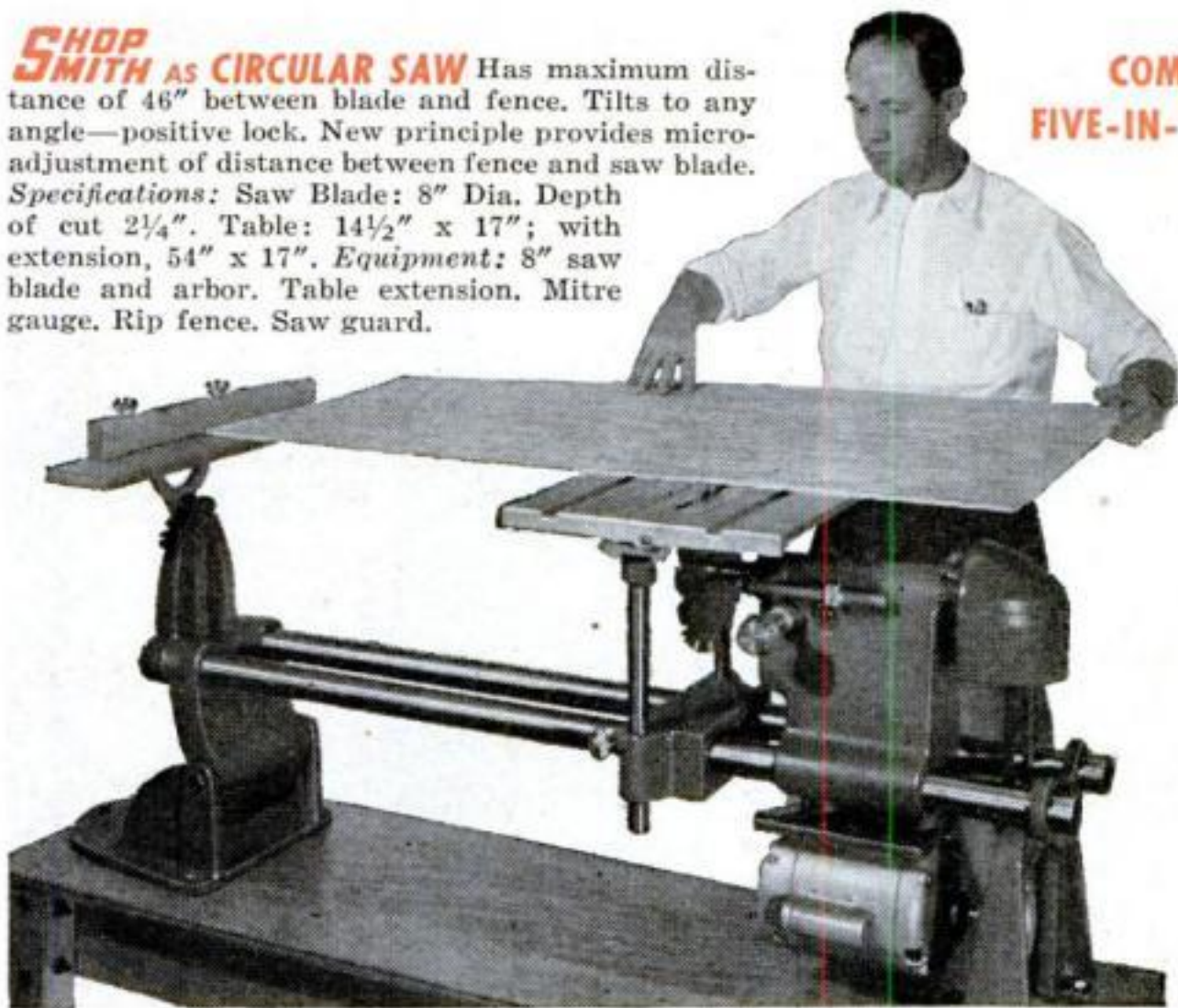
## Thousand-Ton Squeeze

WEIGHING 300,000 pounds and capable of exerting a force of 2,000,000 pounds, the giant press shown above is considered the most advanced hydraulic testing machine ever built. Made by the Baldwin Locomotive Works, it is in operation at the University of Washington's structural research laboratory. The machine will take specimens up to 10 feet wide and 80 feet long, and is used for tension and compression as well as for transverse testing. Several new features in the design make the steel columns more rigid than has been possible up to now, giving the machine greater accuracy and versatility. It will be used in special testing research for industries in the Northwest.



# NEW FIVE-IN-ONE SHOPSMITH OUTWORKS SINGLE PURPOSE POWER TOOLS

**SHOP SMITH AS CIRCULAR SAW** Has maximum distance of 46" between blade and fence. Tilts to any angle—positive lock. New principle provides micro-adjustment of distance between fence and saw blade. *Specifications:* Saw Blade: 8" Dia. Depth of cut 2 1/4". Table: 14 1/2" x 17"; with extension, 54" x 17". *Equipment:* 8" saw blade and arbor. Table extension. Mitre gauge. Rip fence. Saw guard.



COMPLETE  
FIVE-IN-ONE TOOL

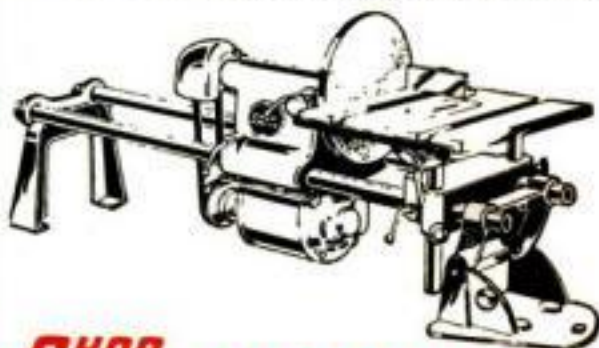
**\$159.50**

With special 1/2 H.P. ball bearing motor, \$195.50



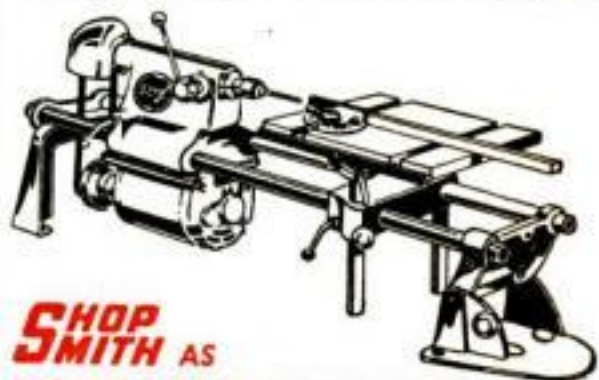
**SHOP SMITH AS VERTICAL DRILL PRESS**

Capacity: Drills to center of 15" circle. Clearance: Table to chuck—27" max. Spindle: 3/8" Dia., 6 spline, hardened tip. Spindle Feed: 4 1/4". 4 grease-sealed Fafnir ball bearings. Variable speeds. Table: 14 1/2" x 17". *Equipment:* 1/2" Jacobs key chuck. Fence.



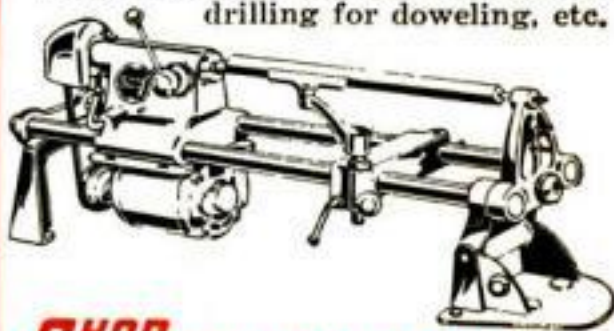
**SHOP SMITH AS DISC SANDER**

Disc Diameter: 12". Table Dimensions: 14 1/2" x 17". Tilting Table. *Equipment:* 12" disc. Mitre gauge.



**SHOP SMITH AS HORIZONTAL DRILL PRESS**

Only Shopsmith performs this highly useful function. No limit to length of work. Provides accurate method of drilling for doweling, etc.



**SHOP SMITH AS WOOD LATHE**

34" between centers. Swing: 15". Variable speeds. Quill Feed: 4 1/4". *Equipment:* Tool rest. Drive center. Dead center.

**Shopsmith Brings You Five Sturdy Tools—Circular Saw—Wood Lathe—Disc Sander—Horizontal And Vertical Drill Press—All Engineered Into One Space-Saving Unit—59" Long By 21" Wide**

WITH SHOPSMITH you get the *five* basic tools shown here—also convertible to grinder, buffer, router, drum sander, shaper, scratch brusher. And you can change from tool to tool in less than one minute. Each tool is . . .

#### BUILT RUGGED

Has cast iron headstock and carriage. Centerless ground and polished steel ways. Heavily reinforced table. Four life-long grease-sealed Fafnir ball bearings. Weighs over 200 pounds.

#### PRECISION MACHINED

Each Shopsmith part is precision-machined, factory-tested. Carriage is precision-bored and gauged. Gives cutting tool and work support constant relationship. *You can work more accurately with Shopsmith.*

#### WAIT TILL YOU SEE IT!

Thousands of craftsmen are finding new fun and profit with Shopsmith right now. And more Shopsmiths are on the way. If it isn't in your city today, it will be soon. Write for full details and free descriptive folder.



Magna Engineering Corporation,  
465 California Street,  
San Francisco 4, California

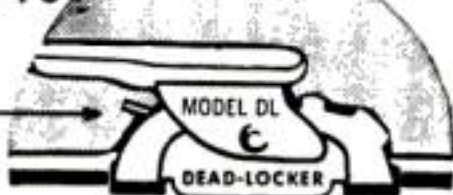


# ANCO® RAIN-MASTER® "Dead-Locker"®

## WINDSHIELD WIPER ARMS and BLADES

BLADE SNAPS ON...  
STAYS PUT

FINGER-  
TIP  
RELEASE



CAN'T FALL OFF  
CAN'T BLOW OFF

(A war-born invention—by ANCO—first)  
(for military aircraft—now for your car.)

## DON'T SHOOT YOUR GAS-PUMP MAN!

He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car . . . in stormy weather . . . with your dull old windshield wipers that SMEAR and SMEAR. He'll gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!



PATENTS  
MAKE JOBS

After all, it's YOUR car to protect. So YOU remind HIM. Get RAIN-MASTERS . . . patented features . . . original equipment for years on DeLuxe models of quality cars . . . and on high-grade trucks . . . used also on our fighting Ships and Tanks and Trucks and Bombers too . . . because ANCO RAIN-MASTERS clean quicker, clean cleaner . . . last longer.

**May save you a costly smashup!**

Ask for RAIN-MASTER Windshield Wiper Arms and Blades next time you buy gas.

Quality Protected Under Fair Trade Laws  
ANCO Patented Products - Patents Make Jobs

**THE ANDERSON COMPANY**  
GARY, INDIANA  
Our Thirty-first Year in This Business

# PRESSURE QUEEN

## Outperforms them all



The only portable spray painting outfit having 4 cylinders in space usually required for one. Paints buildings; refinishes automobiles; inflates tires; lubricates chassis and farm machinery. Does more work in an hour than hand brushing in a day. Uniform pressure without pulsation. Ideal for home, farm, service station, machine shop and contracting painter. Factory tested and guaranteed.

● If your dealer does not sell Pressure Queen, order direct for immediate shipment.

**\$99.95**

**THE CAMPBELL-HAUSFELD CO.**

151 RAILROAD AVE.

HARRISON, OHIO

## Guides you to hobby happiness

### Woodworking handbook and catalog of **homecraft®** Power Tools

Send for  
your copy  
today!



**10¢**  
Postpaid

Shows how you can have a complete home shop without spending a lot of money! Gives you useful information: Plan for woodworking bench. Handy hints on using a band saw. Reference charts on screws, bolts, board measure. Dimensions for power-tool stands. Method of enlarging plans and drawings. Names of helpful books. Get your copy of Catalog HC-1!

Ask us for your Homecraft dealer's name.

DELTA MFG. DIV., 683G E. Vienna Ave., Milwaukee 1, Wis.

## V-8 DUALS & SINGLES



DEALERS WANTED

## MUFFLERS

### STEELS and ALUMINUMS with a motorboat tone

SINGLES, Chev., V-8, Plymouth, Steels \$5.50, Aluminum \$7.00. Chry., Olds., Buicks, etc., Steels \$7.50, Aluminum \$9.00. V-8 and MERCURY DUALS, Steel \$17.50, Aluminum \$21.00. Split Manifold Sets, Steels \$35.00, Aluminum \$45.00. Aluminums are guaranteed for life of your car.

**SANDEE MUFFLER CO.**

BOX 296 LA TIJ., LOS ANGELES 43, CALIF  
2624 W. SLAUSON AVE., LOS ANGELES, CALIF.



# MAKE \$ MORE MONEY

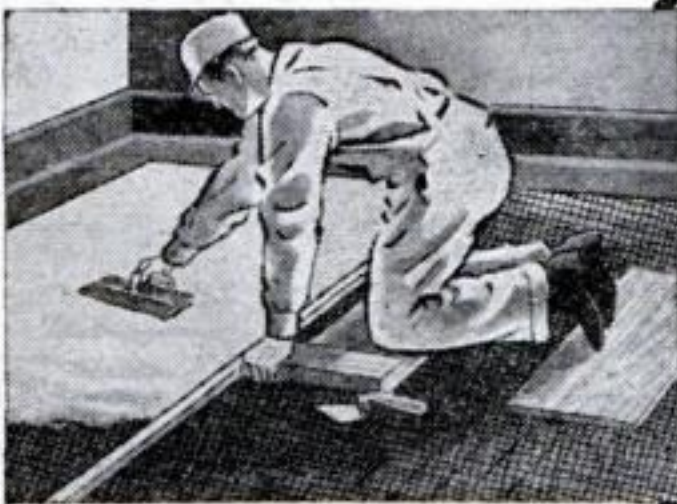
Applying or Selling

## CORKSTONE

A General Purpose Magnesium Oxychloride Flooring

THE MODERN PLASTIC FLOORING

**EASY TO APPLY**  
Here's your opportunity to get into business for yourself applying or selling Corkstone, the economical, top-grade plastic flooring. Plenty of profit. Act without delay!



**Dealers & Agents Wanted**

WRITE FOR DETAILS

**LASTING PRODUCTS COMPANY**

200 Block S. Franklinton Rd., Baltimore 23, Md.



## ASSEMBLE YOUR OWN CAMERA

SAVE UP TO 4/5TH RETAIL COST!

**It's Fun, It's Economical**

Embossed Leatherette Masonite finish. Kit complete with all parts: lens, shutter, screws, glue and complete simple instructions.

**Model FP101 Film Pack Camera 2 1/4 x 3 1/4 \$2.98**  
plus 80c Excise Tax and Postage

**Model RF220 Super Roll Film, Size 120 \$3.98**  
plus 99c Excise Tax and Postage

See your local dealer, or order direct. Check or Money Order, No C.O.D.'s. Dealer Inquiries Invited. Reg. Discounts.

**CAM-KITS, INC., Dept. PS Carlsbad, N. Mex.**

## GET A GENUINE DELTA REDDYlite ELECTRIC LANTERN

6-volt. Shoots beam 800-ft. Light revolves in a circle—"stays put" at any angle you set. Dozens of uses. Buy at hardware, sport, and electrical stores.

\$2.98  
less battery

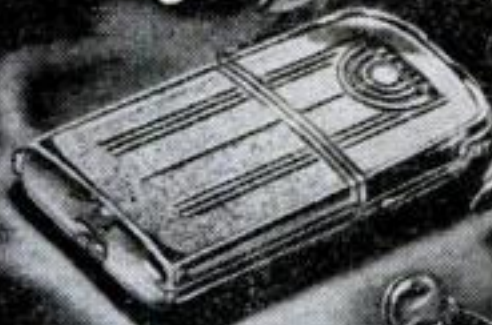


**Delta** ELECTRIC CO.  
Marion, Indiana

Say You Saw  
It In Popular Science

## New Type Hearing Aid

Needs No  
"Fitting"



New Radionic *Zenith* "75"

This is all you wear. \$75 complete.

**SAVES YOU OVER \$100**

Coupon below brings it to you—no salesman, no visits to salesrooms. Hear better or pay nothing!

## MONEY-BACK TRIAL!

Wear the Zenith "75" at home, at work, anywhere. If it isn't better than you ever dreamed ANY hearing aid could be, return it within 10 days of receipt and Zenith will refund your money in full.

Because it needs no "fitting," it comes to you by mail—no salesman to high pressure you, no embarrassing visits to salesrooms. If its price had to include "fitting," middlemen's profits and high sales commissions, the Zenith "75" would have to sell for \$195 instead of \$75. So do as tens of thousands have already done. Order your Zenith "75"—mail the coupon today.

BY THE MAKERS OF THE WORLD-FAMOUS ZENITH RADIOS

Look only to your doctor  
for advice on your ears and hearing



—MAIL THIS COUPON TODAY—

Zenith Radio Corporation  
Hearing Aid Division, Dept. PS78  
5801 Dickens Avenue, Chicago 39, Illinois

☐ I enclose check or money order for \$75\* for one Zenith "75" Hearing Aid. Unless I am completely satisfied and find the Zenith "75" superior to any other hearing aid, I may return it within ten days of receipt and get my money back in full.

\*Plus tax of \$1.50 in Illinois or New York City; \$1.88 in California, except Los Angeles, \$2.25.

☐ Please send me free descriptive literature.

Name.....

Address.....

City.....State.....

JULY 1948 229



# AMERICA'S FINEST HOUSEHOLD OIL



**NEW** anti-sludge ingredients, new rust-inhibiting agents, greater penetrating power and balanced viscosity make famous 3-IN-ONE *better than ever*. There are hundreds of uses for regular 3-IN-ONE Oil around the home, office, workshop and garage. Buy a can today!

For guns, tools, workshop and farm equipment, always use

## 3-IN-ONE HEAVY BODY OIL

Lubricates, prevents rust and tarnish, is non-sludging and will not run off.

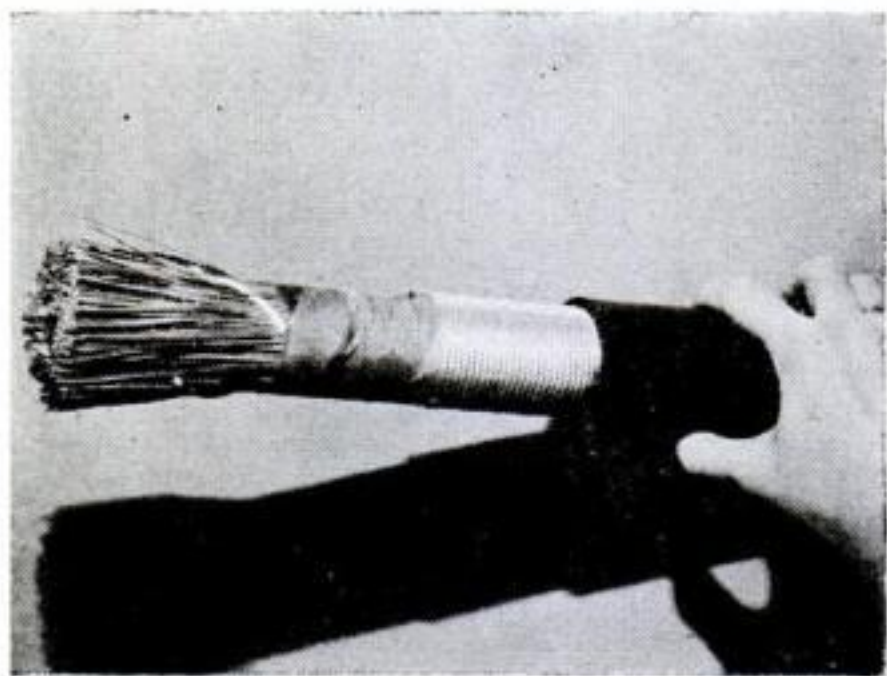


**BUY BOTH TODAY!**



## 'Scope Is Stereoscopic

SHOP workers get a better look with this microscope when performing minute industrial operations. Images are seen right side up, in three dimensions, through separate eyepieces that are adjustable and designed to accommodate workers wearing safety goggles. A glass plate, clipped to the objective holder, protects the lens from oil and flying chips. Developed by the American Optical Co., of Southbridge, Mass., the instrument comes in 9-, 18-, and 27-power models.



## Shields Phone Cables

A NEW cable sheathing has been developed by the Bell System to help end the phone shortage. Lead, the usual cable sheathing, is scarce, so the new sheathing is made of aluminum and polyethylene plastic. It is to be used in local exchange areas on pole lines and in underground conduits. Cutaway section in photo shows, from left to right: wiring, paper binding, aluminum sheeting, and covering.



# FAMOUS CLINTON GASOLINE ENGINES...

• NEW. Complete, ready-to-run, compact, dependable 4-cycle single cylinder aircooled gasoline engines, by world's largest producer, specializing in 1½ to 3 H.P. engines. Over 300,000 in world-wide use.



MODEL 700 ABR 6

1½-2 H.P. MODEL 700A .....	\$59.50
2½-3 H.P. MODEL 1100A .....	\$74.75
1½-2 H.P. MODEL 701AS .....	\$72.50
2½-3 H.P. MODEL 1101AS .....	\$87.75
1½-2 H.P. MODEL 700ABR6 .....	\$75.00
2½-3 H.P. MODEL 1100ABR6 .....	\$90.25

Rope starter, direct drive models 1200 to 3600 r.p.m. for power tools, lawn mowers, air compressors, wood saws, etc.

Kick starter attached, direct drive for scooters, midget autos and machinery.

Gear reduction 6 to 1, built-in, for machinery, garden tractors, conveyors, etc., requiring shaft speeds from 200 to 600 r.p.m.

## ORDER DIRECT---AND SAVE!

These are all Factory-Fresh Engines—Not War Surplus—With standard 90-day guarantee. Order with confidence. Send Check or Money Order. Immediate Insured Deliveries. Michigan purchasers only—include 3% sales tax. Free literature.

CLINTON ENGINE CO. • 16353 East Jefferson • DETROIT 30, MICH.



**MAKE HOLLYWOOD STYLE CEMENT POTTERY,** birdbaths, benches, coffee tables, stucco-rock, rustic garden walks, etc. Many more. Color concrete with chemicals. Start with small capital. 10¢ brings sample, pictures, details.

**HOLLYWOOD CEMENTCRAFT**  
8527-B Wonderland Ave. Hollywood 46, Calif.

**In General-Purpose 4-Ohm Intermittent Tests**  
**THE "EVEREADY" NO. 950 FLASHLIGHT BATTERY**  
**OUTLASTS ALL OTHER BRANDS!**

Say You Saw It In Popular Science

# FREE

- 10 Official Ranger Rifle targets
- descriptive folder telling how you can become a sharp-shooting Ranger



Rifle shooting with a "22" is loads of fun and thrilling competition! Why not join the thousands of riflemen all over the country now enjoying RANGER shooting activities. Send for 10 free official targets and free folder today!

### HERE'S WHAT THE FOLDER TELLS:

How to be a RANGER—How to get the 3-inch orange, silver and black shooting emblem—How to "play safe" with a gun—How to get more free literature (tips on shooting expert's advice)—How to start a RANGER Rifle Club.



SPORTSMEN'S SERVICE BUREAU  
343 Lexington Avenue  
New York 16, N. Y.

Please mail to me free and without obligation: "How To Be An N.R.A. (National Rifle Association) RANGER" and 10 official RANGER targets.

NAME.....  
STREET.....  
CITY..... ZONE..... STATE.....

This advertisement sponsored by

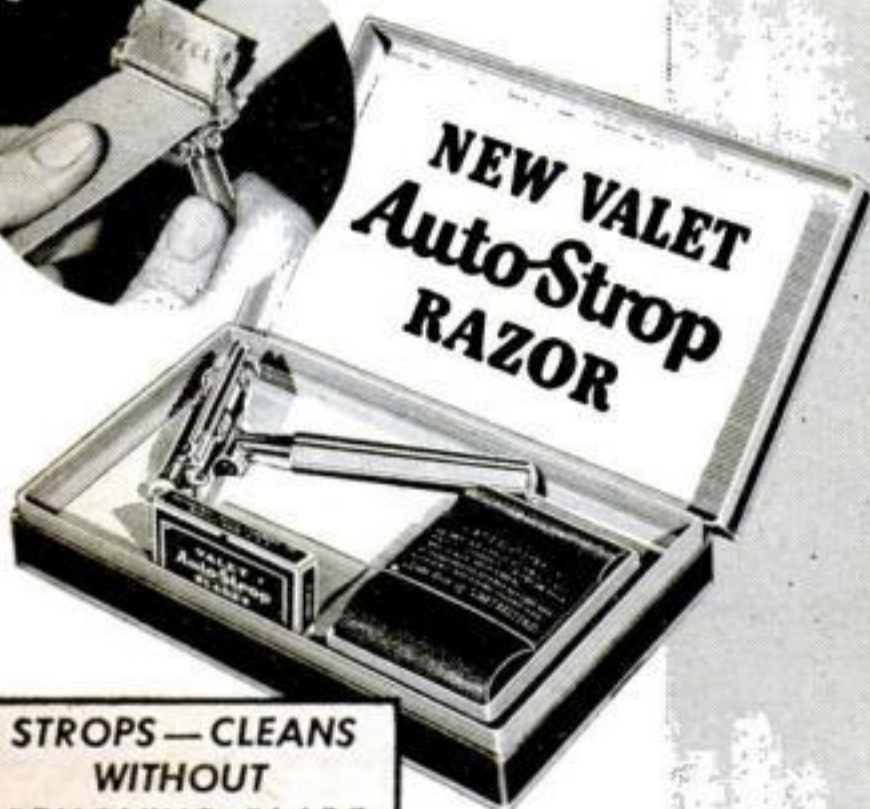
**SAVAGE ARMS CORPORATION**  
**CHICOPEE FALLS, MASS.**





STROP YOUR RAZOR  
AS A  
BARBER DOES!

**For extra  
shaving  
comfort plus  
economy**



STROPS — CLEANS  
WITHOUT  
REMOVING BLADE

RAZOR, STROP  
AND  
5 VALET BLADES

**\$1.25**

SELF-SHARPENING . . . ONE PIECE



WRITE FOR YOUR **FREE** COPY OF THE NEW  
**KRW HYDRAULIC PRESS BOOK**

Describes all manner of Production  
and Shop Work on KRW Hydraulic  
and Bench Type Arbor Presses. 32  
pages illustrating the new KRW  
Hand-operated, Electric-operated  
and Air-operated Hydraulic Presses.  
*Write for your copy today.*



K. R. WILSON, DEPT. 54, 215 MAIN ST., BUFFALO 3, N. Y.

**SOUTH  
BEND**

## NEW BALL BEARING LIVE CENTER

Designed for maximum strength and rigidity, the Ball Bearing Live Center is recommended for high speeds, heavy roughing cuts, etc. 60 degree point runs in substantial precision ball bearing which is easily replaceable.



Center with No. 2 taper  
shank . . . **\$11.50**

With No. 3 shank . **13.50**

**SOUTH BEND LATHE WORKS** 456A E. Madison St.  
South Bend 22, Ind.

## USE YOUR BENCH SAW

FOR JOINTING & CUTTING MOULDINGS



With our six inch tool steel cutters make mouldings, casings, drop-leaf tables, grooves beading and jointing. Moulding cutters, A 1 in. wide \$1.50. 1 1/2 in. \$2.00. Jointing cutters, B 1 in. \$1.50. 1 1/2 in. \$2.00. E 1 in. for drop-leaf tables, \$1.50. E 1 1/2 in. Makes 3/4 in. cove & Quarter. \$2.00. Postpaid. Guaranteed. State size hole. List & Folder free.

**JOHN A. SANDSTROM**  
Clearwater, Fla.



## FILLS HOLES, CRACKS, DENTS, GOUGES

Master craftsmen use these finest fillers



2 oz. Tube  
Postpaid -25¢

**WEBB PRODUCTS CO.,** 232 S. "G" Street, San Bernardino, Calif.

## Ottawa Self-Propelled Buzz Master

**CLEAR LAND FAST!** Powerful 7-HP motor with friction clutch for safe operation. Cuts down timber, brush and hedge; turn blade vertically and saw logs to length. Also furnished with post hole diggers. Has clutch pulley for belt work.



**OTTAWA MFG. CO.,** 1-801 Brush Ave., Ottawa, Kansas



## OWN A Printing Business

Cards, Tickets, Stationery, etc. Good profit in spare time. **PRINT YOUR OWN** greeting cards, movie titles, church work, etc. Save money. Easy rules supplied. Raised printing like engraving too. Have home shop. Sold direct from factory only. Send dime for supply book, suggested outfits, all details and advice on your needs. No obligation. **KELSEY, INC.** C-33, MERIDEN, CONN.





# SCREW DRIVER TIPS

Choose a screw driver just as carefully as you pick a plane, chisel or other fine tool. And don't try to make one screw driver do for all jobs. The best costs so little, it's a real economy to have a full range of sizes and styles . . . long ones for more powerful driving, short ones for close-quarter work and the correct tip width to fit all sizes of screws. Blades tempered entire length. Stanley makes them all the Stanley way.

Coupon brings you two books . . . one FREE, the other the popular workshop textbook, clothbound, illustrated, just \$1.



NO. 1009 . . . . . handy for tight places. Blade 1 1/2" long. Unbreakable composition handle.



NO. 2702 . . . . . for Nos. 5 to 9 Phillips Screws. Blade secured by swaged ears.

NO. 25 . . . . . 3' up to 12' blades. Bolster construction locks blade in wood handle.

THE TOOL BOX OF THE WORLD

## STANLEY

Reg. U.S. Pat. Off.

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

Stanley Tools,  
278 Elm St.,  
New Britain, Conn.

Please send me by return mail: ☐ FREE booklet, "The Joy of Accomplishment".  
☐ 188-page book, "How to Work with Tools and Wood". \$1.00 enclosed.  
(In Canada: send order to Stanley Tool Co. of Canada, Ltd., Roxton Pond, Quebec)

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

MANIFOLD PRESSURE  
BOOST CONTROL

The  
Gadget  
of the  
MONTH



The best buy we've had in months. Brand new in original cartons. Contains a vacuum booster pump, a bellows assembly and innumerable other valuable parts. Our supply is limited so rush your order now to avoid disappointment.

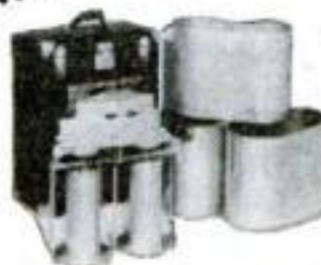
(Add 40c each to cover postage and handling)

**\$1.95**

WILLARD  
2 VOLT  
BATTERIES  
ONLY

**\$1.25**  
each

Brand new. Compact spill-proof. Built-in Hydrometer. Group several together for higher voltages. Use Standard Electrolyte. Guaranteed. Add 35c to cover postage and handling.



Film  
Developer  
ONLY **\$2.00**

One of the finest bargains offered. This unit is complete with three stainless steel tanks that nest one inside the other. Includes a carrying case. The film winder has a 110-volt 60-cycle motor and automatically reverses itself. Spools are 4 inches in diameter by 10 inches high. Tanks are 11 1/2 inches high by 8 1/2 wide by 16 1/2 inches long.

(Shipped express charges collect)



Beach Shoes  
3 pr. **\$1.00**  
for

Wooden Klox, really nice beach shoes wooden, soles approximately 5/8" thick with cotton web top, sizes 6 thru 12.

(Add 35c ea. pr. to cover postage and handling.)



Today's  
Best Buy **\$18.00**

New 4 conductor 16 gauge rubber covered cable. Color coded. Used by United States Government as Field Telephone Cable. 1300 feet on steel reel. F.O.B. Our warehouse Shipped motor freight or express shipping charges collect.

RUBBER GLOVES

New genuine Government surplus Rubber Gloves, Gauntlet type, 14 inches long. Have all kinds of uses where it is necessary to protect the hands, such as washing cars, walls, or such.

— Sizes —

small, medium, large

3 pair for \$1.00, plus 30c postage and handling.

Minimum order - 3 pair



**N. SILVERSTINE CO.**

6532 EAST McNICHOLS ROAD DETROIT 12, MICHIGAN

"Seven Acres of Surplus"

We cannot accept orders for shipment outside U.S. or its possessions. All merchandise subject to prior sale. Minimum order \$2.00. No C.O.D. shipments. Mich. Residents add 3% Tax.





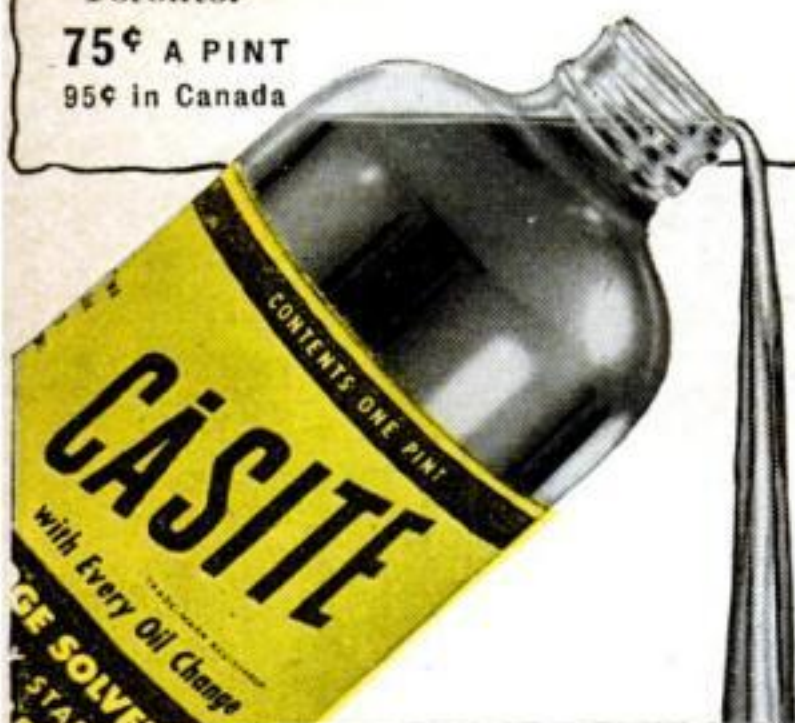
## What's Extra Protection Worth to You?

★ To keep your motor alive and powerful—give it Casite's extra protection.

Casite cuts engine wear and cuts repair bills because it improves lubrication. No matter what kind of motor oil is being used, Casite helps it get around—quickly and into the tight spots. It retards the formation of sludge and gum . . . frees sticking valves and rings . . . cleans your motor and keeps it clean.

Get Casite today—and get Better Motor Performance or Double-Your-Money-Back. The Casite Corporation, Hastings, Michigan, and the Casite Division, Hastings Ltd., Toronto.

75¢ A PINT  
95¢ in Canada



**IMPROVES LUBRICATION  
CUTS ENGINE WEAR**



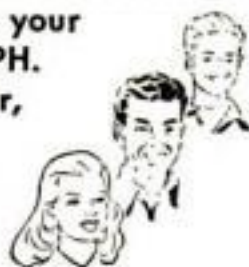
## POWERBIKE

**gets you there safely and economically**

The motor is in the rear, mounted low to aid balance and handling. No grease to rub off on your legs, no hot fumes blowing in your face. 100 miles per gallon, 30 MPH.

1½ HP fan cooled engine, kick starter, automatic clutch, fits any man's or woman's balloon-tire bike. See your dealer or write direct.

TERRITORIES AVAILABLE.



**SAGINAW PRODUCTS CORP. • SAGINAW, MICHIGAN**



Saw blade tilts  
table stays flat

## New POWER KING 8" SAW

• All your "construction" work—shelves, cabinets, furniture—can be built in a fraction of the time with this accurate Power King saw in your shop. Big 18" x 20" table, has 10⅝" ahead of blade. Saw cuts 2⅝" deep. Precision ball bearings assure long service. Rip fence locks at both ends, releases instantly for positioning or removal. It's America's outstanding table saw value. See it at your Power King dealers today, or send postcard for free literature.

**NOW ONLY  
\$58<sup>75</sup>**

F.O.B. Warsaw  
less motor

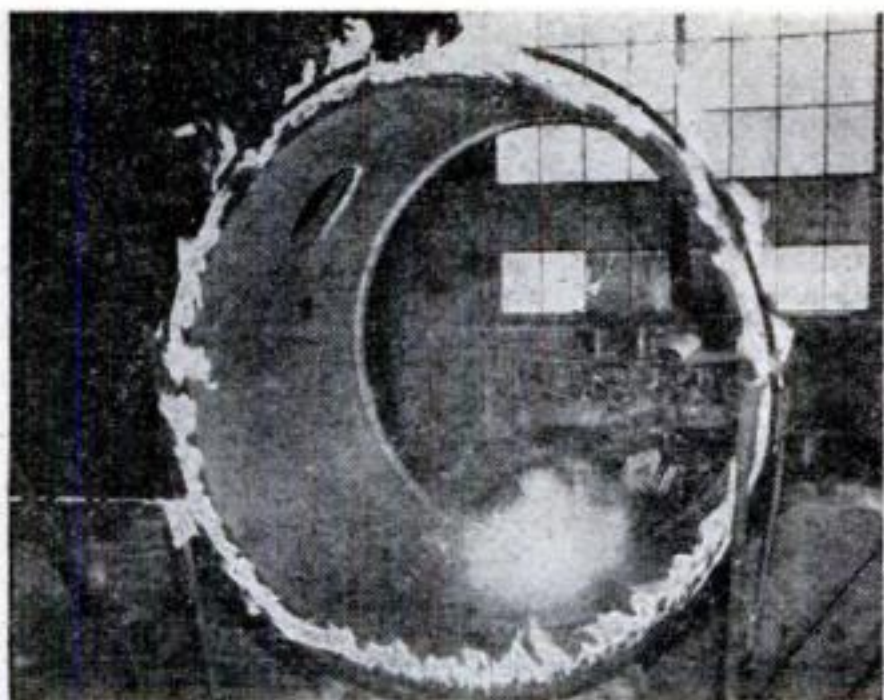


**POWER KING TOOL CORP.**

735 Cleveland Street  
WARSAW, INDIANA

Division of ATLAS PRESS COMPANY





## Flames With a Purpose

RESEMBLING the fiery hoop through which circus acrobats leap, this is the shell of a ball mill being subjected to a special pre-heating treatment before welding. The spectacular firing, necessary because the cylinder is made of both armor plate and mild steel, is done by a circular gas line with continuous pinhole outlets. The scene illustrated in the photograph above, taken at the Mount Vernon, Ill., plant of the J. P. Devine Mfg. Co., shows the pre-heater at full blast while a welder works in the background.



## Paint Retards Fire

A SINGLE coat of this self-sealing, ready-mixed paint gives a fire-resistant surface to plaster, concrete, steel, or wood. A washable product, it comes in an assortment of pastel shades. The manufacturer of the paint—called Fire Stop ①—is Plicote, Inc., of Pittsburgh, Pa.

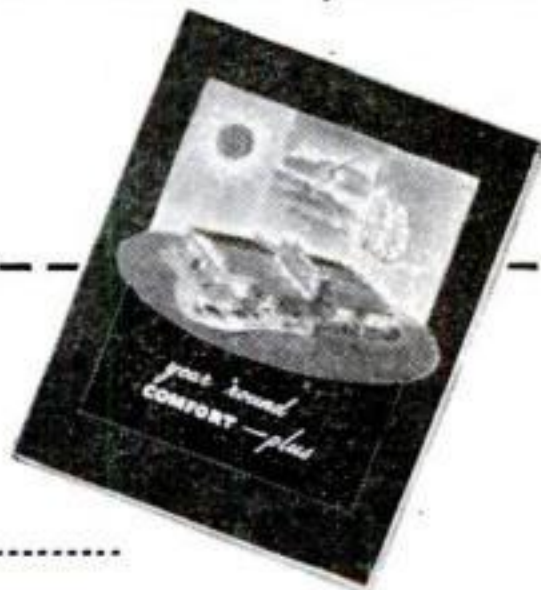


"I'm simply MELTING!"

Even on summer's hottest days, your home can be up to **15° COOLER** with

**Carey** ROCK WOOL INSULATION

**GET THIS FREE BOOK...** shows how and where to "comfortize" your home.



Mail this coupon to  
Dept. PS-7  
Philip Carey Mfg. Co.  
Cincinnati 15, Ohio

NAME .....

STREET .....

CITY .....ZONE..... STATE.....



# SAVE FILM



## Perfect pictures always

Snap each scene only once—knowing for *sure* that you'll have a perfect picture. And you *can* be *sure* with the WESTON. It gives you the correct camera settings for any scene, any camera, any film including color. Avoid disappointments . . . save film. At photo dealers everywhere.

# WESTON

## EXPOSURE METER

*Master II*



The meter  
most photographers use

## Stucco Spraying • Today's Outstanding Business Opportunity



Beauty and protection are sprayed on old and new buildings exterior and interior surfaces . . . by COLORCRETE. It's a plastic, water-resistant material, spread evenly over surfaces and forced into cracks by air pressure. Fuses to masonry with enduring tenacity. Many textures. Range of 30 smart colors. Fully proven by 20 years of actual use under all conditions.



### BIG EARNINGS FOR COLORCRETORS

Colorcrete ties in with today's huge building program. Renews old buildings. Makes new construction more attractive and enduring. Large waiting market, because building owners get long lasting beauty and protective values at low price. Yet your selling price can be several times your basic cost. Machine is easy to operate. Moderate investment. Write or wire for complete information.

COLORCRETE INDUSTRIES, INC.

572 Ottawa Avenue

Holland, Michigan

# COLORCRETE

## BUILD YOUR OWN ENLARGER



Enjoy Photography's most fascinating hobby at a fraction of usual cost. With simple step-by-step instructions and diagrams plus a screwdriver and pliers you assemble your own Enlarger and Save! Get all features of more expensive Enlargers: precision machined aluminum alloy castings, 90° tilt for wall projection of prints, spherical aluminum lamphouse, helical rack and pinion focusing with extra large knobs, unconditional guarantee.

Write Today for Free Illustrated Folder

CALIFORNIA TECHNICAL PRODUCTS CO.  
8510 Warner Drive, Dept. K-7, Culver City, Calif.

## Make Your STOP LIGHT SHOUT!



### AMAZING STOP LIGHT FLASHER!

Make Your Stop Light Flash 115 Times Per Min. A SENSATION! Automatic. Instant acting when foot brake applied. Non-rusting. Dust, Oil, Vapor & Waterproof. Used by police & fire depts. Attach in 5 min. to any model car or truck. Approved by leading safety engineers. FREE WITH ORDER. "HOW TO SAVE MONEY ON CAR 'Motoring Hints' BOOKLET". ACT NOW! If dealer can't supply send \$3.00 cash or M.O. We pay postage.

"STOP-IT" makes  
stop light flash 115  
times per min.

MACCHI & CO., Dept. SU  
927 Larkin St., San Francisco, Calif.  
Dealers & Agents Wanted

## NEW LOWEST-PRICED ARC WELDER

### Makes All Types of Welding Easier

Here is the world's easiest welding . . . the new "Lincwelder" 180 AC. Its exclusive "Arc Booster" makes arc striking as easy as striking a match. Simplifies welding of all kinds.

Safe to operate . . . open circuit voltage never exceeds 52 volts. Built for rural power lines . . . draws less than 37 amps. when welding at 180 amps. Approved by power companies and REA. Of highest quality industrial-type construction . . . yet sells for only \$150, the lowest price of any welder of this capacity. Full details in Bulletin 370. Write your local Lincoln Welder or The Lincoln Electric Company, Dept. 312, Cleveland 1, Ohio.

PRICE  
**\$150**  
FREIGHT  
PREPAID



SEE IT...  
TRY IT

"Lincwelder"  
180 AC with  
the amazing  
"Arc Booster"

Accessories at slight extra cost.





**IMMEDIATE DELIVERY!**

Complete  
as shown

**\$24<sup>95</sup>**

F. O. B. ROYERSFORD, PA.



**BENCH SAW**

**CUTS THROUGH 2<sup>5</sup>/<sub>16</sub>"**

**UNCONDITIONALLY GUARANTEED ONE YEAR**

Comes complete with Floating motor mount—miter gauge with adjustable stop—aluminum guard—soft aluminum insert—spring steel splitter—heavy gray iron fence—(no motor—no blade). Table 12" x 14". Tilts to 45°—Oilite bearings. Shipping Wt. 48 lbs.

**AMERICAN MACHINE & TOOL CO. Inc.**

DEPT. 200

ROYERSFORD, PA.

WRITE FOR FREE BOOKLET AND GUARANTEE BOND

**BUILD YOUR OWN  
POWER LAWN MOWER**

**WHY BREAK YOUR BACK  
MOWING FIELD OR LAWN?**

WRITE  
FOR  
**FREE**  
LITERATURE  
The Rite-Way  
Mower  
Attachment  
Ball Bearing

**SAVE MONEY  
SAVE TIME**

Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for FREE information.

**T & H MFG. CO., Dept. M-117  
811 E. 31, Kan. City 3, Mo.**

**FASTEST PLANER in the WORLD  
at this Low Price... \$195<sup>00</sup>**

**BELSAW Multi-Duty Planer**

Speed up production! Increase your profits! BELSAW power self-feeds at 24 feet per minute... The lowest-priced surfacer that will handle 12 x 6 in. stock. Planes green or dry sawed lumber into smooth, worked forms. Three high-speed steel knives make 42 cuts per inch. Multi-duty BELSAW takes inexpensive attachments for all planing mill operations—Jointing, Rabbing, Grooving, Matching. BELSAW is the **only** 12 in. planer providing **attachments for jointing and grinding its own knives**. Start planning NOW for BIGGER VALUE and BETTER PERFORMANCE, with BELSAW. Write for FREE specifications, illustrations and low prices.

● LARGER CAPACITY ● FASTER  
OUTPUT ● KNIFE SHARPENING  
ATTACHMENT

**BELSAW MACHINERY CO B-1028 Field Bldg., 315 Westport Rd., Kansas City, Mo.**

**HERE'S ONE  
for your boat!**

*The right one!* From the complete six-model Evinrude line, it's easy to choose the motor that gives you exactly what you'd like in power and performance. Three thrilling four-cylinder motors... smoothest on the water! A brilliant new "Sportwin" with dozens of exciting new features! Two models with the revolutionary FISHERMAN DRIVE—*weedless, shoal-riding, snag-proof*... a boon to fishermen! See your Evinrude dealer—look for his name under "Outboard Motors" in the yellow pages of your phone book. Catalog FREE—write EVINRUDE MOTORS, 5808 N. 27th St., Milwaukee 9, Wis.



**SPORTWIN**

28 thrilling new features — it's complete even to a fuel gauge!

**SIX MODELS**

the right motor for every boat — 1.5 to 33.4 certified horsepower.

**WRITE FOR  
CATALOG!**

**EVINRUDE**

FIRST IN OUTBOARDS • 39th YEAR



# DON'T DIE for a CIGARETTE

Get this Amazing Invention:  
HANDS YOU A LIGHTED READY-TO-  
SMOKE CIGARETTE while You Drive

Avoids Accidents. Ends risky fumbling for cigarettes, matches or dashboard lighter. Clamps on any steering post. Endorsed by safety authorities.

600,000 new  
in use!



TERRIFIC  
FOR GIFTS

ONLY \$6.95  
Postage  
Prepaid

FITS  
ALL  
CARS

Sensational  
*Pres-a-Lite*

Holds 23 Cigarettes. Made of Bakelite and Aluminum. 100% Automatic. Patented. Exclusive. Hands you lighted, ready-to-smoke cigarettes—one at a time—without losing control of steering wheel. Sold by leading stores everywhere—or Mail Coupon Below. Do it now!

DEALERS! JOBBERS! Write for sure-profit plan.

PRES-A-LITE SALES CORP., Dept. M3  
79 Madison Ave., New York 16, N. Y.

Gentlemen: Send me the PRES-A-LITE prepaid.  
Enclosed is check ☐ or money order ☐ for \$6.95.

NAME.....ADDRESS.....

CITY.....ZONE No.....STATE.....

# New BRUSH Electroplater

ESPECIALLY BUILT FOR  
MECHANICS, MODEL MAKERS  
HOME CRAFTSMEN

Easy to Plate GOLD, SILVER, NICKEL,  
COPPER, etc... For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc. with a durable, sparkling coat of metal... Gold, Silver, Nickel, Copper, Cadmium, and after a bit of practice, even Chromium! Everything furnished—equipment complete, ready for use. By doing a bit of work for others, your machine can soon pay for itself. So make your shop complete by getting a Warner Electroplater right away. Send today for FREE PLATING SAMPLE and illustrated literature. ACT AT ONCE.  
**WARNER ELECTRIC CO., Inc., Dept. T-16**  
1512 Jarvis Ave., Chicago 26, Illinois

- For
- MODEL MAKERS
- MAINTENANCE
- HOBBY SHOPS
- HOME SHOPS
- SALVAGE PARTS

**FREE Details & Sample!**

WARNER ELECTRIC CO., Inc., 1512 Jarvis Ave., Chicago 26, Illinois, Dept. T-16  
Gentlemen: Send Free Sample and Details to:

Name.....  
Address.....  
City.....State.....

ASSEMBLE

*King Midget*



45 MILES AN HOUR

90 MILES A GALLON

PRACTICAL • SAFE • LOW COST • TRANSPORTATION

New, low cost transportation. Practical. Safe. A pleasure to drive. Home assembly keeps cost low. Just bolt together our factory built units. Immediate delivery. Send 25c for detailed circular with large picture. 4-view drawings, price of all parts. Or send for actual Assembly Book with 42 photographs, blueprints, drawings, sketches AND above literature—all for \$1 (refunded first order).

**MIDGET MOTORS MFG. CO., Athens, Ohio**

# "YOU ARE UNDER ARREST!"



Help Bring Crooks to Justice Through Scientific  
**CRIME DETECTION!**

We have taught thousands this exciting, profitable, pleasant profession. Let us teach you in your own home. Learn Finger Printing, Firearms Identification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. Over 800 of all American Bureaus of Identification employ I. A. S. students or graduates. We can prepare you for this fascinating work, during spare time. Write today, stating age, for "Blue Book of Crime."

**INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 936-B, Chicago 40, Ill.**

# COMPLETE FLEXIBLE SHAFT MACHINE only

\$19.95



WITH PENCIL-SIZE HANDPIECE for  
"FINGER-TIP" CONTROL. Performs  
countless tasks quickly, easily! Use  
FOREDOMS on wood, metal, glass, plas-  
tics, etc. Provides easy accessibility, un-  
obstructed view. Grinds, polishes, drills,  
mills, engraves, sharpens, slots, sands,  
carves, etc., etc. Complete \$19.95. No. 50 Accessory Set  
\$1.50 additional. Order today. **FREE CATALOG.**

**FOREDOM ELECTRIC CO., Dept. F-108, 27 Park Pl., N. Y. 7**

# WOODWORKERS... Get this

CONSTANTINE MASTER MANUAL

Get the Most Fun From Your Hobby  
Indispensable to woodworkers. Newest, biggest  
edition, more pages, more color, helpful how-  
to-do-it articles, pre-war and new items, more  
bargains. Send 25c today and we will include  
**FREE! FULL YRS. SUBSCRIPTION**  
to Chips and Chats, published bi-monthly. Keeps  
you up-to-date on everything in woodworking,  
offers big money-saving bargains. Send now.

**ALBERT CONSTANTINE & SON, Inc.**  
793-C 135th Street, New York 54, N. Y.



# ELECTRICITY Anywhere



for  
HOMES  
FARMS  
SHOPS  
BOATS  
RADIO  
USE

Onan gasoline-  
engine-driven Elec-  
tric Plants supply  
reliable, economical  
electric service for  
any use. Portable,  
stationary or stand-  
by models. Water or  
air-cooled, compact  
and rugged.

A.C.: 350 to 35,000 watts in  
all standard voltages and  
frequencies. D.C.: 600 to  
15,000 watts, 115 and 230  
volts. **BATTERY CHARG-  
ERS:** 500 to 3,500 watts; 6,  
12, 24, 32 volts.

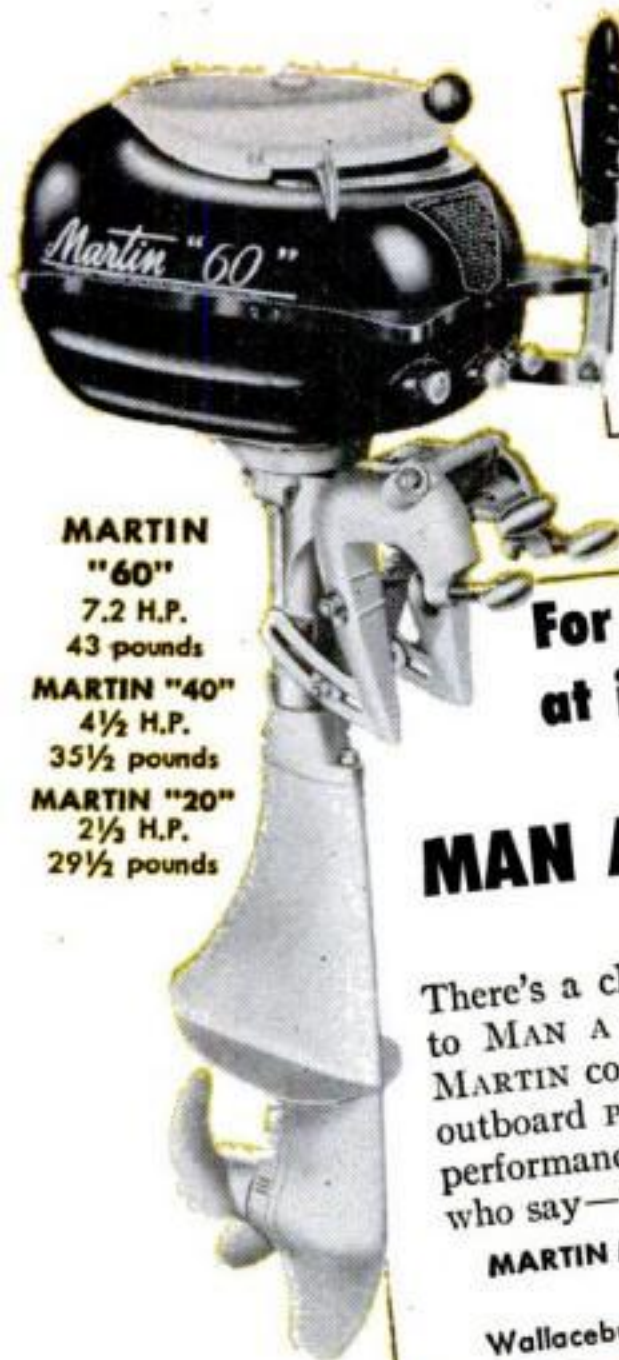
Write for folder

**D. W. ONAN & SONS INC.**

2785 Royalston Ave., Minneapolis 5, Minn.







**MAN A MARTIN** for thrilling top speed performance. MARTIN's exclusive patented, mechanically-controlled poppet valves set a new standard of performance in outboard motors.

**MAN A MARTIN** for smooth, unbelievably slow trolling speeds. MARTIN's sputter-free operation at slow speeds adds to fishing pleasure.

**MAN A MARTIN** for more family pleasure on the water. MARTIN has the features for all around easy handling by any member of the family.

**For outboard motoring at its best . . .**

**MAN A Martin**

There's a choice of three great outboard motors, when you decide to MAN A MARTIN, and enjoy outboard motoring at its best. A MARTIN combines all the finest features you would expect in a great outboard PLUS exclusive features which have enabled it to set new performance records. Take a tip from America's keenest sportsmen, who say—"for tops in outboarding . . . Man a Martin!"

**MARTIN MOTORS, Eau Claire, Wis.,** Division National Pressure Cooker Company  
Canadian Sales by: **MARTIN MOTORS,**  
Wallaceburg, Ontario, Division National Pressure Cooker Company (Canada) Ltd.

**The NEW Standard of Performance!**

**INSERT MOLLY**

**TURN SCREW**

**FULLY INSTALLED**

**REMOVE SCREW**

**WITH MOLLY YOU CAN FASTEN ANYTHING** and do it quickly, neatly and safely. MOLLY will hold fixtures securely to floors, ceilings or any hollow wall construction . . . Simple to install, all you need is a screw driver. Sold by leading hardware stores everywhere.

*Write for Free Descriptive Folder*

**PLACE FIXTURE**

**FIXTURE MOUNTED**

**MOLLY**

**SCREW ANCHORS**

**MOLLY CORP.**  
522 COURT STREET  
READING, PA.

## SERVICE ANYWHERE

No matter where you are—whether it's in an agricultural community, a small town, or a bustling metropolis—you'll find nearby parts and service facilities for

## CLINTON ENGINES

More than 350,000 users of these famous, easy starting, CLINTON engines are obtaining year 'round performance, using their power for tractors, pumps, generators, small boats, etc. CLINTON engines give peak performance under all conditions . . . give dependable power . . . power when needed.

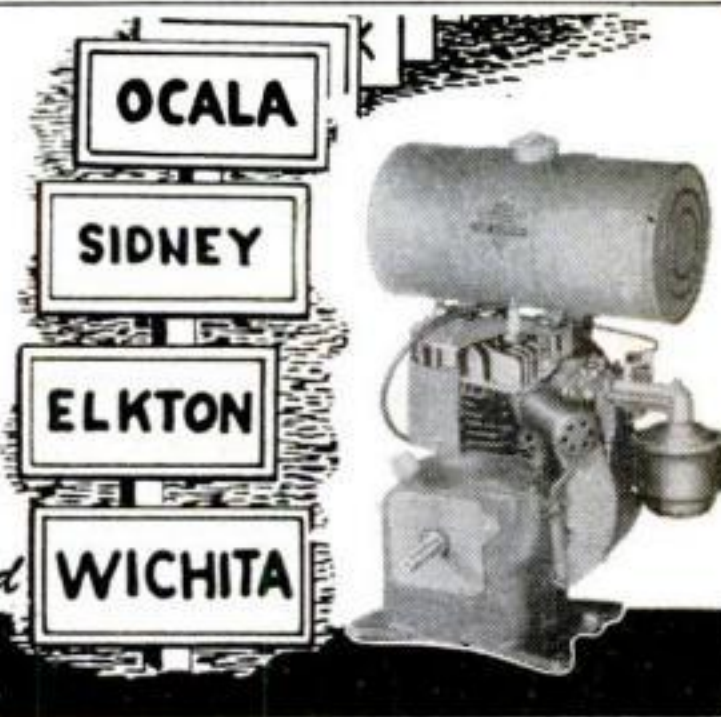
For full information write Dept. 101PS

**4 CYCLE**      **2 POWER RANGES**  
**AIR-COOLED**      **1½ to 2 H.P. • 2½ to 3 H.P.**



*It's Powered BEST When CLINTON Powered*

**CLINTON MACHINE CO.**  
CLINTON, MICHIGAN





## now YOU CAN DRILL YOUR OWN WELLS!

Sturdily Made—Hundreds of satisfied customers. Purchased and used by U. S. Dept. of Agriculture, U. S. Navy and many foreign countries.

Fully Guaranteed  
Price Complete  
\$385.00  
Less Motor  
F.O.B. Factory  
Price includes drill,  
bailer and 100' cable.  
200 ft. of additional  
length available at  
extra cost.



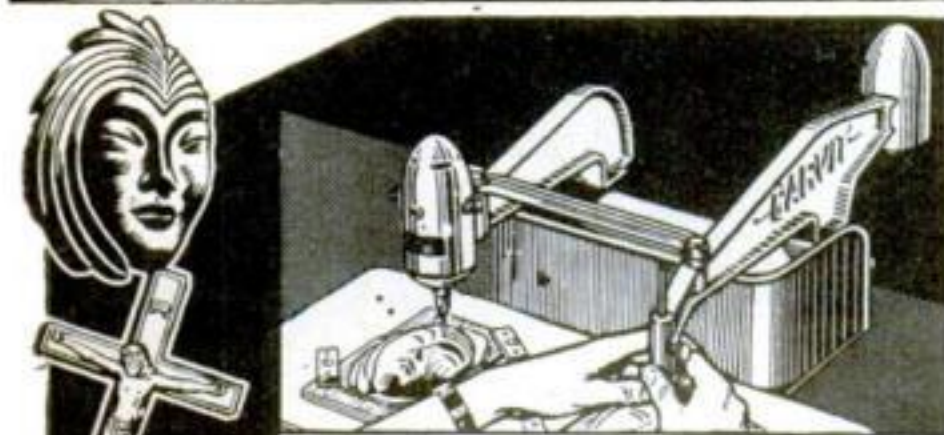
Drill your own wells for that needed water—as many as you need—outside—in the cellar—in the barn. The new improved CONSOL Driller—1948 Model—is equipped with a special replaceable Drill Head. It will drill through many feet of solid rock without re-sharpening. Simple to operate, easy to set up. Do the work yourself at small cost.

We offer 3/4 H.P. Electric Motor or 1 1/2 H.P. Gas Engine to operate the "CONSOL" Well Driller at 38 strokes per minute.

Write for free illustrated booklet.



**CONSOLIDATED INDUSTRIES**  
West Cheshire, Conn.



### Become a skilled woodcarver in 20 minutes!

— with the amazing Dumore Carvit:  
a delightful hobby, complete in one tool!

Carve useful ornaments for the home — distinctive gifts — fine carvings that *sell*! The Carvit reproduces models (from dime store or gift shop) in beautiful mahogany and other fine woods. Just trace the model. The Carvit does the rest. With an index attachment, you can carve objects like busts and statuettes. It's great fun! See it at your hardware or department store today, or write for full details.

Tear Out This  
Coupon and  
Mail Today!

THE DUMORE CO., Dept. G-59, Racine, Wis.  
Check

- ☐ Please send me complete information on the Carvit.
- ☐ Please send me one Carvit, \$48.50 enclosed.
- ☐ Please send one Carvit with index attachment, \$58.25 enclosed. Shipping charges C.O.D.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ ( ) State \_\_\_\_\_

H-15

**SOUTH  
BEND**

## QUALITY LATHE DOGS

Heavy malleable iron. Tail shaped to fit face plate slot. Standard Dog has square head screw. Safety Dog has headless screw. Prices for either style.

	Capacity	Price*	Capacity	Price**
Standard	1/2"	\$0.80	1/2"	\$0.70
	3/4"	.95	3/4"	.75
	1"	1.05	1"	.90
	1 1/4"	1.20	1 1/4"	1.00
	1 1/2"	1.40	1 1/2"	1.10
	1 3/4"	1.55	1 3/4"	1.35
Safety	2"	1.70	*13-inch or larger lathes.	
	2 1/2"	1.95		
	3"	2.20	**9-inch and 10-inch lathes.	
	3 1/2"	3.00		
	4"	4.00		

**SOUTH BEND LATHE WORKS**

456A E. Madison St.  
South Bend 22, Ind.

For QUICK  
Advancement

Learn

## WOOD PRODUCTION ENGINEERING



For quick advancement learn Furniture Drafting and Engineering. You can master these subjects in short time, either through Home Study or by coming to Grand Rapids. Write Today for Free information. State interest, whether correspondence course . . . residence course . . . Also state if veteran.

**KLOK INST.**

Peninsular Bldg.  
Grand Rapids 2, Mich.

## WOOD WORKERS

### Lumber—Plywood Available

Harold Hunt wants to send you big new No. 15-A Catalog. Over 148 pages of wood-working ideas. 12 pages of rare woods in colors. UNEQUALED BARGAINS in imported and American woods, supplies, hard-to-find hardware. Send only 15c to cover postage and handling.

CRAFTSMAN WOOD SERVICE CO.  
2729 S. Mary St. Dept. B-95 Chicago 8, Ill.

only  
15¢



## TRAILER BUILDERS!

**BUILD or BUY . . . SPECIFY.**

• Torq-Less Axles • Bull Dog Hitches and  
Parking Jacks, Safety-Engineered by  
**HAMMER BLOW TOOL COMPANY**  
D-26 Wausau, Wisconsin

Send for FREE Catalog



## NEVER FOLLOW A WRONG STEER GO BY HULL COMPASS

**AUTOMOBILE  
COMPASS**  
(Illuminated)  
\$5.95

At your  
dealer's.



**AUTOMOBILE  
COMPASS**  
(Standard)  
\$3.95

Write for  
circular

**BOAT COMPASS \$2.75**

HULL MFG. CO., P. O. Box 246-E6, Warren, Ohio

## MOTORS-PLANES-CARS-BOATS-MODELS

400 Pictures — 2,000 Model Items

A bible for wide-awake modelers. Model gas engines, planes, boats, cars, rubber-powered planes, jet models, accessories, etc., PLUS articles and stories on building and flying. Send only 10¢, stamps or coins. Also free catalog available.

**SPECIAL: U-Control or Free Flight Flying Outfit, complete with motor, plane and over 30 needed accessories.**

Only \$10 COMPLETE

1/6th h.p. Engines: Thor \$9.95; Genie \$6.95; Judco \$7.25

AMERICA'S HOBBY CENTER, INC. DEPT. S-76 156 WEST 22 ST., N. Y. 11



# Imagine! PORTABLE JIG-SAW



REGULAR \$17.95 VALUE  
Advertising SPECIAL  
AT ONLY

**\$13.45**

• HOBBYISTS

• PATTERN MAKERS • LIGHT PRODUCTION

To prove Concord's amazing values, we offer this get-acquainted JIG SAW bargain for a limited time only! Has all aluminum construction . . . only one third the weight of the usual cast iron power tool. Blade can be turned to any angle; cuts work up to 2" thick, in 14" throat. Has bronze bearings, roller bearing saw guide, built-in blower. Speed 720 r.p.m. 9"x12" work table tips to any angle. Overall size 15 1/2" high, 12" wide, 20" deep, Order No. AD4-15736.

Send Cash with Order. Shipped Express Collect.

**FREE CATALOG** With your order, ask for Concord's FREE illustrated Catalog. 160 pages crammed with every "wanted" radio and radio-electronic item.

**CONCORD RADIO CORPORATION**

901 W. Jackson Blvd. Dept. 48-J Chicago 7, Illinois



## Boat Speedometer

Accurate and practical, at a price you can afford. Polished aluminum case is 5 3/4" wide x 5 3/16" high. Requires only 1/2" hole through dash. Easy-to-read dial is full 3" diameter. Simply installed. Two models: 1 to 35 m.p.h.—\$8.95 and 10 to 50 m.p.h.—\$10.95 postpaid in U.S.A., complete with all connections. A guaranteed instrument. See your dealer or order direct.

MUSKEGON OUTBOARD SPECIALTIES CO., Box 426, Muskegon, Mich.



## Ottawa "YARD-MASTER"

New 2-HP mower with **two speeds and free wheeling**. Does any kind of mowing. 3 to 6 acres per day. Cuts 40 in. swath. Attachments for soil tilling, pumping, spraying and many other labor-saving jobs. Sold only direct to user. Free details. Low price.

**OTTAWA MFG. COMPANY**

4-801 Lawn Ave. Ottawa, Kansas

## Do a Better Job WITH ONE OF THESE EMPIRE LEVELS

**EMPIRE TORPEDO LEVEL**  
Smallest, most handy and accurate level made. "Cigar-shaped"—no sharp corners to tear pocket. Aluminum stock. Only 3 oz. wgt. 9" long. Has Level, Plumb, 45° Vials.  
No. 26 .....\$2.00



### ALUMINUM LEVEL — No. 151

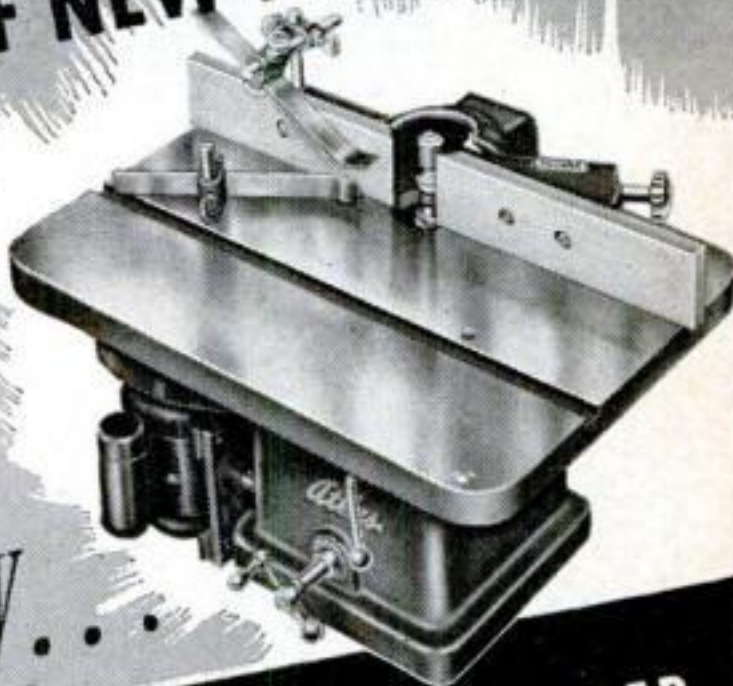
Cast and Machined, a Beautiful Tool, with Patented, Removable Level and Vial.  
With 2 Plumb, 2 Levels, 2 — 45° Vials. 18".....\$6.00  
24".....\$6.50 28".....\$7.00

Order EMPIRE LEVELS from your local dealer.  
Write direct for literature.

**EMPIRE LEVEL MFG. CO.**

Box 97, Dept. 707 • Milwaukee 13, Wis.

# NOW HANDLE HUNDREDS OF NEW PROJECTS!



NEW...

## Atlas WOOD SHAPER

- ★ 21" x 15" PRECISION GROUND TABLE
- ★ STATIONARY SPINDLE (Table raises and lowers)
- ★ PRECISION BALL BEARINGS (Sealed)
- ★ TAKES ALL CUTTERS WITH 1/2" BORE

They say it takes an old, experienced craftsman to appreciate the value of a wood shaper. Perhaps this new Atlas shaper will change that idea — because here is one of the most versatile and helpful tools you can have in your shop. It will handle all your shaping work on chairs, tables, desks, lamps, cabinets, beds, doors, trim, window moulding, storm windows and screens. And every job you tackle will come out as smooth and finished as the work of a master craftsman.

This is one of the new Atlas woodworking tools built to industrial quality standards for the men of America who really know tool values. Use the coupon for complete information.



**ATLAS PRESS COMPANY**

755 N. PITCHER ST., KALAMAZOO, MICH.

**MAIL TODAY FOR NEW FREE CATALOG!**

GENTLEMEN:

I'D LIKE TO HAVE COMPLETE INFORMATION ABOUT THE NEW ATLAS WOOD SHAPER.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY, STATE \_\_\_\_\_





**TWO DAYS'  
FUN  
SAVES  
\$200!**

You've seen the CUB Sports Trailer on local lots for more than \$500. You've envied CUB owners who could afford the luxury of an all-metal trailer. Now you can have a CUB of your own—for \$279.50.

Here, for the first time, is a full-size trailer in construction kit form—at less than the cost of materials alone. Best of all, assembly is so simple that you can build the CUB with a crescent wrench and screw-driver—in less than two days.

Actually, the CUB is all but ready to roll when it leaves our factory. Aluminum panels are precision cut and guaranteed to fit, holes are all drilled, and every practical sub-assembly is completed by factory craftsmen. You simply tighten a few bolts—and hit the road with a streamlined sportster that pays for itself on one vacation.

The CUB is 12' 7" long, 6' wide, 5' high, sleeps two, adds only 75 pounds tongue-weight to your car, and includes galley, wheels, fenders—all essential parts except tires and tubes.

F.O.B. Los Angeles, price for full kit—\$279.50

(C.O.D. shipment will be made if at least \$50 deposit accompanies order)

Write for illustrated booklet . . . FREE

**National Trailer Stores**

Dept. 66, Box 2353, Terminal Annex,  
Los Angeles 54, California

**FREE**

**ALLIED'S GREAT  
RADIO CATALOG!**

**172 Value-Packed Pages  
SEND FOR IT TODAY**

**Everything in Radio  
At Lowest Prices!**

Get ALLIED'S latest Catalog—biggest and most complete in Radio! Tremendous values in new Television receivers, home radios, latest Amateur receivers and Ham station equipment, Sound Systems. Everything for the Builder and Experimenter—thousands of parts, tubes, test instruments, tools, books, diagrams and builders' Kits—the world's largest stocks—all at money-saving low prices! Get your copy today.



**The Only COMPLETE  
Radio Catalog**

**FREE  
Catalog!  
Send  
for it**

**ALLIED RADIO**

ALLIED RADIO CORP., 833 W. Jackson Blvd., Dept. 7-G-8,  
Chicago 7, Ill.

☐ Rush FREE 172-Page ALLIED Catalog.

Name.....

Address.....

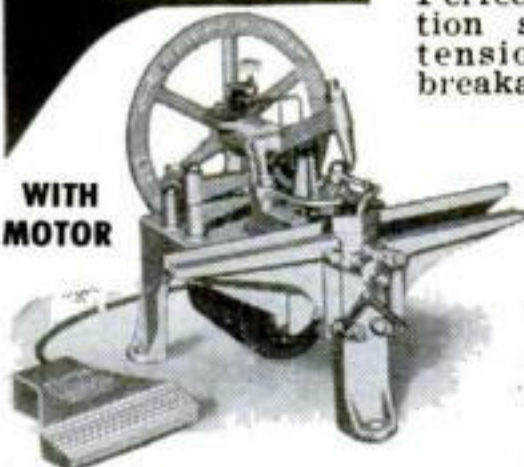
City..... State.....

## AUTOMATIC SAW SET

**HAND AND  
BAND SAWS**

Set Saw TEETH Automatically—400 per minute without effort. Perfect hammer and anvil action sets teeth uniformly—tensions metal. No tooth breakage. Write today!

**WITH  
MOTOR**



**BURR MFG. COMPANY**

8943-U Venice Blvd.  
Los Angeles 34, Calif.

**Retooth Saws Automatically**  
—with Burr Retooter. Cuts new teeth in 50 seconds—any size 4 to 16 points. Old teeth fall off as chips. Easy to operate. A perfect job. Write for literature on Circular Saw Sharpener.

**VALUABLE  
BOOK**

Order Burr's  
Blue Book **25c**  
of Coast to  
Coast Prices for Saw  
Shop Services.

## CURIOUS?

About a

### SHIP-IN-A-BOTTLE?

Here is the secret plus all of the material for only 75c postpaid, less bottle. Also send 10c for complete catalog and ask your dealer about this kit.



**BRAUN-CRAFT**

1232 Etowah, Dept. PS7,  
ROYAL OAK, MICHIGAN

**75c**  
Postpaid  
in U.S.A.



### AIR CORPS Type P23 Headphones

**AT A FRACTION OF ORIGINAL COST**  
8000 ohm impedance, bipolar magnets. Extremely comfortable sponge rubber cushions, stainless steel leather covered headbands, concealed terminals. 6 ft. cord with PL55 plug. BRAND NEW. \$15.00 Value.  
No. 5A134  
Spec. Per Pair..... **\$2.95** Plus 25c each for Postage.

FREE Catalog on Everything in Radio and Electronics.

Burstein-Applebee Co. 1012 McGee, Kansas City 6, Mo.

## NEWEST OTTAWA LOG SAW

**SELF-PROPELLED — MOVES  
ANYWHERE on OWN POWER**

World's fastest Log Saw. Powerful 6 H-P air-cooled motor. Attachments for sawing down trees, buzzing limbs, post hole digging and pulley for belt jobs. Big demand for wood, pulp, posts. Make big money sawing wood this easy way. Low factory-to-user prices. Nothing like it. FREE details.  
**OTTAWA MFG. CO., 7-801 Pine St., Ottawa, Kansas**



## The SPEED SAW FILER

**Saves You Time, Money**

Now you can do expert saw filing at home. Lifetime tool makes precision filing easy for even the most inexperienced. Two simple adjustments make it fit any type hand saw. Keep your saws extra sharp and true-cutting with a Speed Saw Filer. Complete with file, ready to use. Money back guarantee. Cash with order, prepaid (C.O.D. postage extra.)

**THE SPEED CORP.**  
2025-B N.E. Sandy, Portland 12, Ore.



**ORDER  
NOW!**



**\$295**





# GENSCO

## SLOYD KNIVES & WOOD CHISELS



MADE  
IN  
SWEDEN

Sweden's toughest charcoal inlaid steel goes into these hand-honed, razor-sharp knives! They're ideal for wood, plastics, linoleum . . . for carving, carpentry, and general shop work. Curly birch, easy-grip handles. 6 1/8", 6 7/8", and 7 1/16" lengths.

MADE  
IN  
SWEDEN

Here's UNBEATABLE tool craftsmanship . . . Swedish charcoal steel tanged-butt wood chisels, individually heat-treated, tempered and honed! Blades have beveled edges for straight chipping and cutting. Curly birch handles. Sizes from 1/4" to 2" wide.

See Your Hardware Dealer or Write:

## GENSCO TOOL DIV.

General Steel Warehouse Co., Inc.  
1830 N. Kostner Ave., Chicago 39, Ill.



### DEEP TONE Dual Mufflers for Ford, Mercury

Scientifically designed straight-thru muffler reduces back pressure. Greater power, speed, and economy. NEW brilliant Deep Tone makes your car standout. Heavy blowout-proof construction. Rugged steel tube throughout (No aluminum).

**Simplified Installation.** No cutting, no holes to drill. Rubber mounted clamps eliminate usual rattle. Complete with all necessary fittings, etc. Order direct and save. State year and model. Sent C.O.D. from Los Angeles. Price \$20. "Deep Tone" single muffler for Chevrolet, Ford, Plymouth—\$4.86. All other makes—\$5.50. Chrome tail pipes, 2 1/4" dia. \$1.75

**ADVANCE MUFFLER CO.**  
6800 S. Vermont, Dept. PS-78, Los Angeles 44, Calif.

## Thompson

### BEATS the World on BOATS

**Safe Boats With Full Length Spray Rails**  
Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" Boats. Two big factories—save you freight.

**CATALOG FREE**  
Write for your copy. State kind of boat in which you are interested.


**THOMPSON BROS. BOAT MFG. CO.** (151)  
219 Ann St.  
PESHTIGO, WIS.

**Light Boat for Auto**  
Write to (either place)  
219 Elm St.  
CORTLAND, N.Y.



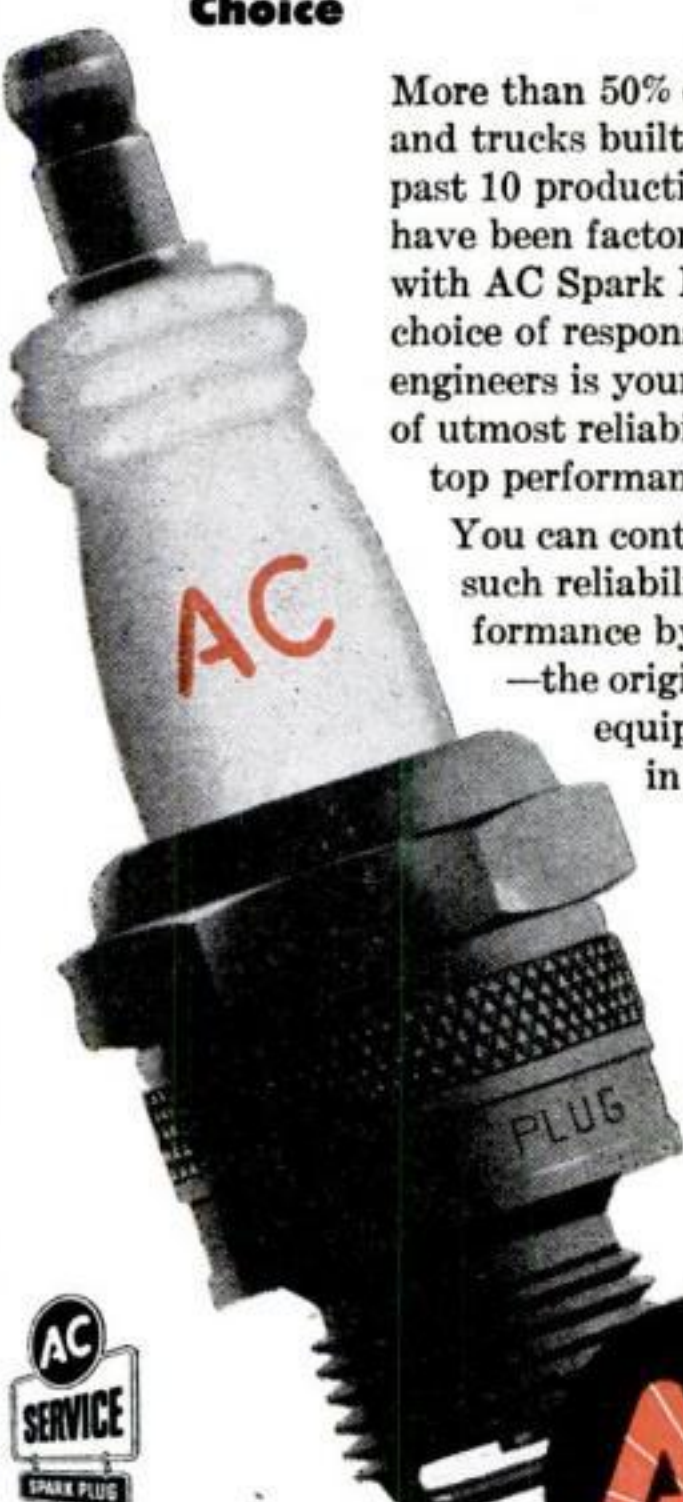
**Better Built  
Lower Prices**


- Canoes
- Rowboats
- Outboards



# First

in Original  
Factory-Equipment  
Choice





## AC

### SPARK PLUGS

More than 50% of all cars and trucks built during the past 10 production years have been factory-equipped with AC Spark Plugs. The choice of responsible engineers is your assurance of utmost reliability and top performance.

You can continue to have such reliability and performance by buying AC—the original factory-equipment choice in spark plugs.

**FIRST IN SERVICE, TOO**  
Your AC dealer will check your spark plugs to see that they are of the right Heat Range.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION



# NEW Electric SANDER



**OREMEL**  
ELECTRIC  
POWER TOOLS

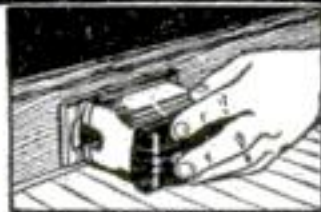
Only  
**\$14.85**  
POSTPAID

## Amazing MOTO-SANDER AND POLISHER

**Saves Time—Saves Effort!** Dremel has developed a combination electric Sander and Polisher for home or shop... so easy to handle that a child can use it. New, inexpensive "Moto-Sander" delivers about 7,200 strokes a minute. (Short, rapid stroke frees dust from sandpaper... makes paper last longer). Moto-Sander does a magically smooth job of sanding... gets into places other sanders can't reach. Rubber cushioned sanding pad measures 2 1/4" x 5 1/2". Cam-type-clamp paper holder permits changing sandpaper in seconds. Moto-Sander has only two moving parts... never needs oiling or adjustment... weighs only 2 1/2 lbs. Uses 110-120 volt, 60 cycle A.C. electric current (only). Gives no radio interference. Comes with 8 ft. (Underwriters' Approved) rubber cord plus 6 sheets assorted grade Garnet paper, plus 1/8" thick felt pad and sheepskin for wax polishing.

**Fine Finish—Fast!** Use Moto-Sander to get satin smooth finish on woodwork, stairways, doors, furniture; ideal for sanding boats, gun stocks or scale models. Just guide it. Uses #2/0 Garnet paper or finer. For speedy, effortless polishing of waxed furniture, automobiles and other surfaces, use felt pad or sheepskin (furnished) in place of sanding paper. Moto-Sander is the lightest, most practical electric sander on the market—the only one of its kind.

**MONEY-BACK GUARANTEE:** If your dealer does not have Moto-Sander, send only \$14.85... we'll pay postage. Or send \$2 now, and pay postman balance plus postage. Money back if not delighted after 5 days' trial. Dremel Mfg. Co., Dept. 128-G, Racine, Wis.



EASY FOR  
AWKWARD PLACES



SANDS FLAT  
SURFACES EVENLY



GETS INTO  
TIGHT CORNERS



ROUNDS CORNERS  
LIKE MAGIC

# FLATFISH!

## The "Action" Lure!

What a fish wants above all else is ACTION. That's why it goes all-out for the Flatfish. World's largest selling lure. Over 3,000 sold every day. Lures in 21 colors. Underwater, surface and trolling models, \$1.35 each. Musky, \$1.45. Flyrod size, \$1.10. Send 20c for 48-page booklet with plug-fishing instructions by famous anglers.



**HELIN TACKLE CO.**

Send 20c for  
**CATALOG!**

6342 Pulford  
Detroit 7, Mich.

# JADE-LIKE STONE YOU CARVE WITH A KNIFE

## Sculpstone



FOR FUN OR PROFIT. With the beauty of jade and workability of wood, inexpensive SCULPSTONE can easily be made into priceless articles.

**NO SPECIAL TOOLS ARE REQUIRED.** SCULPSTONE CAN BE CUT WITH A KNIFE, FILED, DRILLED, SANDPAPERED, OR TURNED ON A LATHE.

SCULPSTONE is mined in Egypt and the Far East and closely resembles jade. Its colors range as follows: varicolored, white, black, green, etc. Send \$1.00 for introductory Kit and price list. Special Hobby Kit sent for \$5.00. Large sizes and crude boulder stone available. Postpaid; No C.O.D. "See page 201 of June 1948 issue of POPULAR SCIENCE MONTHLY."

**SCULPSTONE INC. 178 Suffolk St. New York 2, N. Y.**

## WHEELS



Semi-Pneumatic with Firestone Tires: 8 x 2 - \$2.00, 10 x 1.75 - \$2.25. Industrial with B. F. Goodrich Heavy Duty Tires: 10 x 2.75 - \$4.95. Pneumatic with B. F. Goodrich or Schenck Tires and Tubes: 400 x 8 - \$12.50. With hi-speed Timken Roller Bearings - \$17.50 Post Paid. Send Check or Money Order—No C.O.D. or Stamps. Complete line of Wheels and Casters—Send for Free Catalog.

**GREAT LAKES WHEEL CO.** P. O. BOX 1501 Milwaukee, Wis.

**NONE BETTER!**

## SUPER DRILL GRINDER



Sharpens round shank drills from 3/32" to 1 1/16" in diameter, up to 11" long. Grinds old drills like new in 4 different point angles, using hand or power grinding wheels. Money-back guarantee.

Price only \$2.95

At Dealers or Postpaid

Crandall Mfg. Co., 1512 W. Slauson, Dept. FB-31 Los Angeles 44, Calif.

# THIS IS THE BUSINESS YOU DREAM ABOUT

QUICK STEADY PROFITS

## CORADIO

The Coin Operated Radio

IT'S the new, fast-growing, depression-proof business. Coin operated radios are

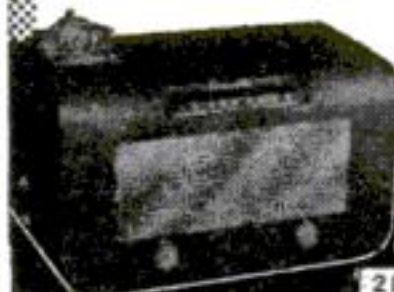
placed in hotels, tourist courts, clubs, hospitals, etc. on a commission basis—play 1 or 2 hours for 25c and produce immediate profits. The best coin operated radio is CORADIO

**ACT NOW**

Start your own lifetime business, full or part time. Limited capital required.

Send for further information.

WRITE TODAY Dept. P.S.



**CORADIO**  
COIN OPERATED RADIO

212 Broadway, N. Y. 7, N. Y., Beekman 3-0038-9

# Windmill Rainbow Flasher



● Patented spinning auto light. Spins with the wind. The most beautiful light in the world. Red, White and Blue. Nothing like it. Everybody wants one. Easily put on auto, truck, bicycle, motorcycle, airplane or canoe, radiator. Spins facing front or back. Trade discounts. Money-back guarantee. Agents wanted. Be first. Write today. Pay mailman \$2.00 plus postage when you receive the flasher, or send \$2.00 and postage will be paid. 4 wings or flying ace-propeller. State which.

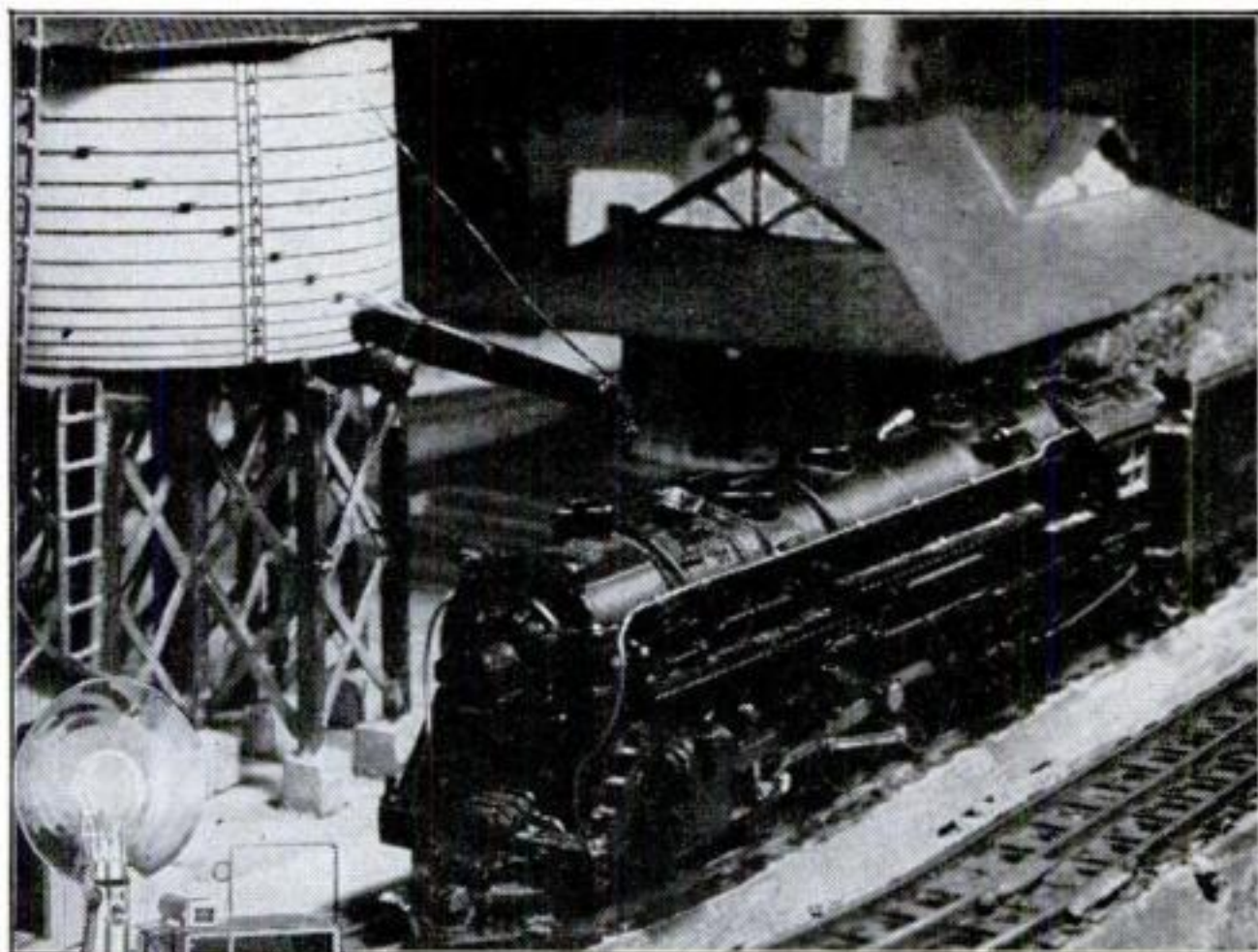
**SPIN LIGHT CO.,**

373 Belmont Ave.

Haledon 2, N. J.



# MAKE LIFE-LIKE PHOTOS OF YOUR FAVORITE HOBBY WITH THE *Pacemaker* **SPEED**



## GET PRIZE-WINNING PICTURES WITH **GRAFLEX**

Western Division Office, 3045 Wilshire Blvd., Los Angeles, Cal.

# GRAPHIC!

Do you have a detailed model train layout that you've never thought of photographing? Or one that you *have* photographed, but not to your satisfaction?

Start to take "breathing" pictures of your pride and joy with a new Pacemaker SPEED (or Crown) GRAPHIC! Whatever your hobby, you can get more fun out of it by taking sharp, clear shots suitable for hanging . . . or for record purposes.

It will pay you to see your Graflex dealer today! Meanwhile, write for literature, Graflex, Inc., Room 32, Rochester 8, N. Y.

GRAPHIC cameras and accessory photo-products are manufactured only by Graflex, Inc., Rochester 8, N. Y.

**Gas  
Ration**

**INCREASE GAS MILEAGE  
GANE AIR-FLOW NEEDLES**  
Adds 1 to 4 MORE Miles. Smoother, Easier Starting, Slower Idling, Faster Pickup. Ask YOUR Service Station, Garage, Car Dealer to replace your ordinary idling screw with GANE, the NEW Carburetor improvement. \$1.75 each installed. 10-Day Free Trial Money Back Guarantee. Order Direct Mail card for Free Data.  
**Gane 2425 E. 57th St. L.A. 11 Calif.**

## REMOTE INDICATORS

(For use with Remote Weather Vane Indicator as described in POPULAR SCIENCE, p. 180, March 1948.)



Selsyn remote position indicators. When the shaft of one unit is turned the shaft of a remote unit will follow to the same position. Operates at any distance with only simple electrical connections in between.

Brand new units manufactured by General Electric, 2 1/4" diam. by 3 1/2" long, with threaded shaft and nut. Pair operates with capacitor on 115 volt/60 cycle AC house current. Capacitor and complete instructions included.

**STOCK NO. SEL-50**..... **\$3.95** Pair

Mail orders please include 30c per pair east of the Rockies, 50c west, for postage and handling.

**DUBIN ELECTRONICS CO., INC., Dept. PS-7**  
103-02 Northern Blvd., Corona, N. Y.

Tel. HI 6-3066 • Send postcard for bulletins on "surplus" electronic eqpt.

## OVER 250 SURPLUS BARGAINS Write for FREE Catalog PS-7 TODAY!



**Genuine  
Air Force  
SUN  
GLASSES**

NOTE: These glasses are surplus property of U. S. Air Forces. \$10.00 value. (none genuine without this spec. no. 6 base lenses precision ground by Fischer, Bausch & Lomb, American Optical. Complete with case. **\$4.95**  
AAF "Type" Sun Glasses \$1.98 Prepaid



**SAFE! NEW C-2  
AIR FORCE RAFTS**  
Holds 1 or 2. Complete! Mast, sail, pump, paddles, anchor, etc. Compact. **\$19.75**  
Wt. 19 lbs. govt. cost \$125.00

**PK-1 Raft** (as illustrated). New, without sail, etc. . . . **\$14.95**

**5 - 7 Man Raft.** Opens approx. 5x9 ft. Complete with sail and other accessories. Wt. 60 lbs. **\$34.95**



**Genuine  
M-6 COMPASS**

Precision compass by "Sherrill". Easy to compensate, equipped with nite lite, excellent for planes, boats, trucks, cars, etc. Easily mounted. Instruction manual and calculator included. \$25.00 value. Prepaid **\$5.95**

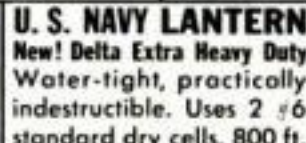


**NYLON-JUNGLE  
HAMMOCKS**  
Brand new hammocks. Insect proof, rot proof, zippered. Complete with ropes and canopy, hanging rings, etc. Wt. 9 lbs. Govt. cost \$14.00. Only, **\$4.88**



**Genuine B-7 GOGGLES**

Brand New. Air force flying goggles. Metal frames, rubber face pc., adj. nose pc. Precision ground lenses. Govt. cost \$7.20. **\$1.98**



**U. S. NAVY LANTERN**  
New! Delta Extra Heavy Duty Water-tight, practically indestructible. Uses 2 #6 standard dry cells. 800 ft. beam. Wt. 6 lbs. Bulbs incl. \$8.00 value. less batteries **\$3.95**

**U. S. ARMY COTS**  
Re-issue. Guaranteed perfect! Extra sturdy. Heavy canvas covers, hardwood frames. Holds 1,000 lbs. **\$3.75**

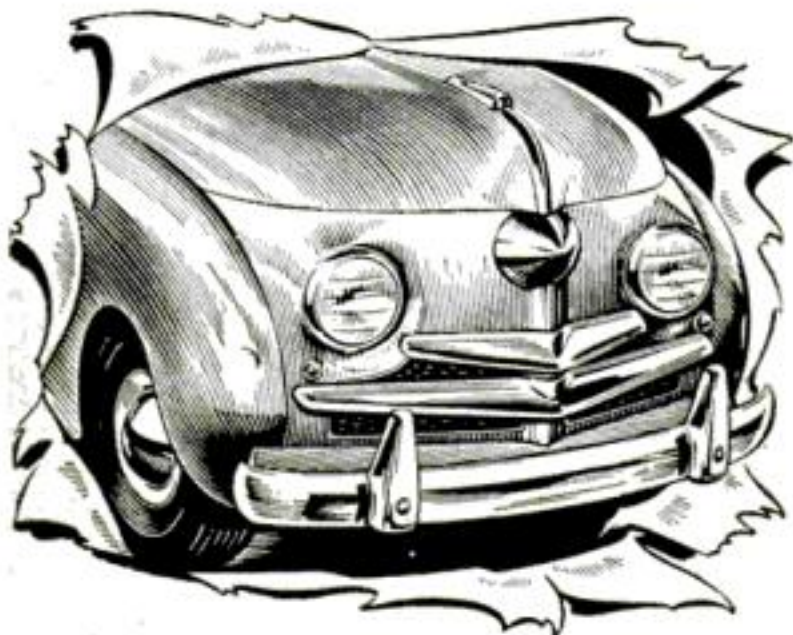
Shipped frt. collect Brand new cots (as above) **\$4.95**

Mail orders add 10% unless otherwise stated.

**FISLER SALES CO.** 721 Walnut  
Kansas City 6, Mo.



# CROSLEY NOW HAS "New Look" THAT



Here's new smartness to make you prouder than ever to drive a Crosley. Now Crosley steps out—steps up—with a newly designed front. It's the "new look"! Massive louvres and a gleaming spinner adapted from aircraft propellers. See the new Crosley today—see why every-one's saying when a Crosley passes, "Crosley cars are better looking than ever."

Available in 6 smart styles—  
Station Wagon:  
Sedan: Convertible:  
Panel Delivery:  
Pick-up:  
Sports-Utility.



Priced at several hundred dollars under comparable models, operate for about half as much. All are roomy, easy-driving, give 35 to 50 miles per gallon. Powered by the revolutionary 4 cylinder Crosley COBRA engine.

## CROSLEY

a FINE car

For beautiful full color catalog, write: Crosley Motors, Inc., 2532-JO Spring Grove Ave., Cincinnati 14, Ohio

### SOUTH BEND

## NEW ADJUSTABLE COLLET BUSHING CHUCK—

provides an accurate method for mounting centerless armature shafts and similar parts in a lathe. Use in either head



or tail spindle. The brass collets are adjustable for running or driving fits. Chucks supplied with 3 collets; 9/16", 5/8", and .637" capacity. Extra round collets, 1/4" to 1" by 16ths, \$1.00 each.

Chuck with No. 2 shank **\$8.95**

Chuck with No. 3 shank **\$9.45**

**SOUTH BEND LATHE WORKS** 456A E. Madison St. South Bend 22, Ind.

## "1948" MODERN MOWER

ALL PURPOSE Rotary Lawn Mower

- Mows lawns
- Cuts tall weeds
- Trims close—clean
- E-Z adjustable
- Aluminum alloy chassis
- Timken bearing spindle
- 4 Ball bearing wheels
- 20" cut. 1 1/2 h.p. engine

Available less Engine



Write for free circular and prices  
**AIR-ELECTRIC MACHINE CO., INC.**  
LOHRVILLE, IOWA, U.S.A.

## Biggest Power Tool Bargain in U.S.

95% of those who see this outfit BUY it — wonderfully satisfied. 5 power tools in single unit: lathe, drill press, circular saw, grinder and sander. Uses 1/4 h.p. motor. Does heavy-duty work. Easy to learn every operation. Complete, only \$34.95. Send \$17.50 (balance c.o.d.) on FREE trial, money-back guarantee. Or write for FREE literature today.



EMRICK, INC., 1757 Clinton, Kalamazoo, Michigan

See it - Use it!  
**FREE TRIAL - 10 DAYS**

GIANT

## Astronomical Telescope

100 diameters magnification. (10,000 area magnification) 3 inch diameter steel main tube 50 inches long. Brass focusing tube. Tripod 6 feet high. Equatorial mounting. Ready to set up and use. Full power and clear vision guaranteed. Price \$15.00. 20% deposit on C.O.D. orders. DEPT. BT, SUFFOLK SCIENCE SERVICE, MANORVILLE, N. Y.

"NO EXPORT ORDERS ACCEPTED"

# LAW

STUDY AT HOME for Personal Success and LARGER EARNINGS. 39 years expert instruction—over 114,000 students enrolled. LL.B. Degree awarded. All text material furnished. Easy payment plan. Send for FREE BOOK NOW—"Law and Executive Guidance."

**AMERICAN EXTENSION SCHOOL OF LAW**  
Dept. 91-PS, 646 N. Michigan Ave., Chicago 11, Ill.

## Sand Casting—Forging—Heat Treating—Case Hardening BRONZE FOUNDRY



In your own workshop allows you to design and build your own GASOLINE ENGINES, STEAM ENGINES, STATUARY, ART OBJECTS, SPECIAL TOOLS, NEW INVENTIONS, ETC. You can also make forgings and case harden steel. Your shop is not complete without a FOUNDRYETTE. Three sizes are available capable of making bronze castings of 1 1/2, 3 and 6 pounds weight, aluminum, copper, brass, etc., \$22.50, \$29.50, \$42.00 f.o.b. Kansas City. Domestic gas supply energy required for operation. Write for circular.

**KANSAS CITY SPECIALTIES CO.**

Box 6022, Dept. S-6

Kansas City, Mo.

## AIR RIFLES BENJAMIN AIR PISTOLS

PIONEERS - LEADERS

SEND FOR FREE FOLDER OF LATEST MODELS TODAY  
If you want a REAL GUN for PRACTICAL USE inside or outdoors get a SAFE - CLEAN - ECONOMICAL - BENJAMIN with Adjustable Power and Amazing Accuracy. For BEST RESULTS use BENJAMIN H-C PELLETS. WRITE AT ONCE. BENJAMIN AIR RIFLE CO., 811 MARION ST., ST. LOUIS 4, MO.

## NEW FAMILY SAFETY JIG SAW READY!

At last—a revolutionary, new electric jig saw small children may use, yet powerful enough to be the basic tool in Dad's workshop! Make "Standing Photo Silhouettes" of favorite snap shots... fancy what-nots, toys, for fun and profit! Handy as a hammer—just plug in! No motor to buy—no oiling. Thousands sold. Use in living-room, apartments, etc. Patented. Nothing else like it. Mail postal NOW for illustrated, Free Circular, low price! Dealers write!



FREE Circular!

**SYNCHRO SAW CORP.** Dept. B-78 ROCHESTER, MICH.



# FREE

value packed

# RADIO CATALOG

write for it today!

## Lafayette Radio

DEPT. KG-8, 100 SIXTH AVE. • NEW YORK 13

### BUILD YOUR OWN BOAT



**PACKAGED BOATS FOR HOME ASSEMBLY**  
Save 50%—build from our complete, easy-to-assemble plywood kits. All parts pre-cut, frames pre-assembled. Finest designs (8 to 18 ft.) available. \$34.50 up. Send 25c (coin) for literature.

**BOAT BLUEPRINTS & PATTERNS**  
60 finest plywood designs—large scale blueprints—full size patterns available—kayaks to cruisers—send 25c (coin) for design catalog or \$1.00 for catalog plus booklet, "How to Build Plywood Boats."

MARINE MART—BUFFALO 7-A, N. Y.

### BUILD "EXTRA" SPARE TIME PROFITS!

Genuine Poly ball bearing arbor C4 (shown) with 1½ x 12½ spindle only \$7.95 postpaid.

Order today!

Free literature available on request.

POLY PRODUCTS, 2032-D E. Walnut, Pasadena 8, Calif.



### BURN WATER IN YOUR CAR



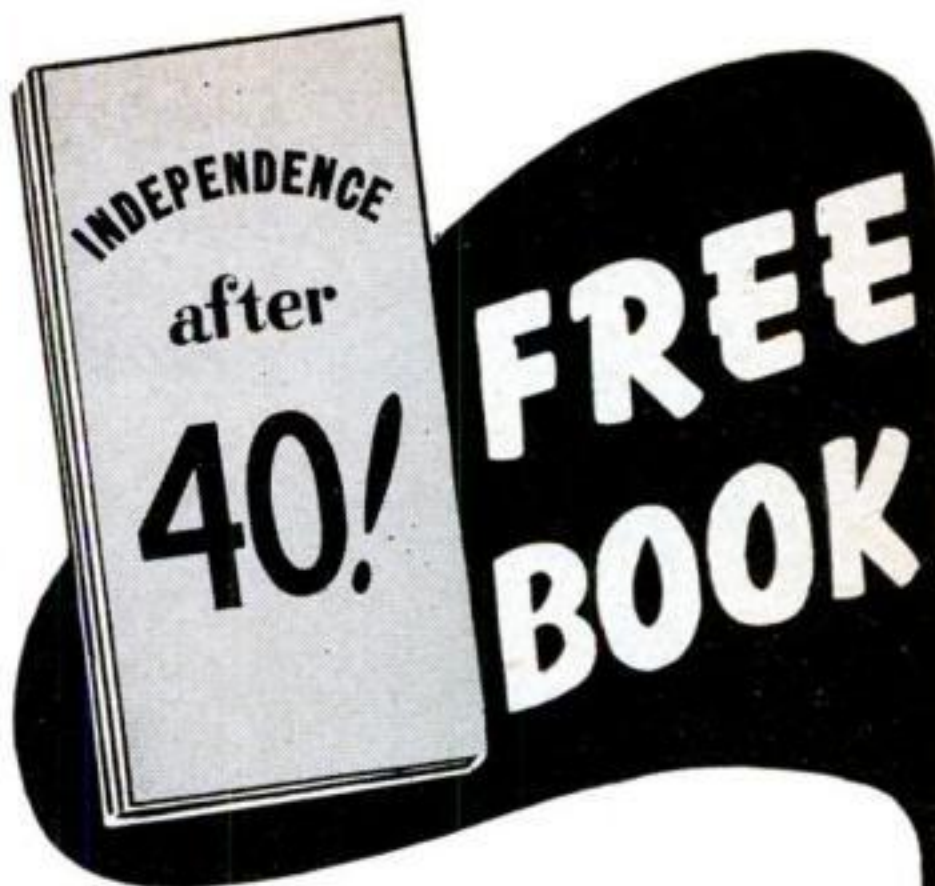
**OCTA-GANE**  
Water Injecting Carburetor

**NEW OCTA-GANE WATER INJECTING CARBURETOR GIVES**  
Better Mileage & Pick up  
More Power & More Pep  
Cleaner & Cooler Motor

OCTA-GANE is the Only Water Injecting Carburetor Engineered on the Venturi Principle  
Only \$24.25 Complete with Tank  
SEND TODAY!

Mail postcard for particulars  
Continental Carburetion  
456 Station A, Richmond, Calif.

DEALERS: Write on your letterhead for information and discount sheets.



Shows how to win

### Independence after 40!

Do you dream of independence and freedom from money worries for yourself and your family? The best way to become independent is to have a business of your own. This FREE book "INDEPENDENCE AFTER 40" shows you a proven, practical, profitable way to start in spare time, with a necessary service in every community—sharpening saws with a Foley Automatic Saw Filer.

#### Start your own Business with SMALL CAPITAL

Here is a steady, repeat CASH business you can start in your basement or garage, with a modest investment and no overhead expense or stock of goods to carry. Machine saw filing pays up to \$2 or \$3 an hour—it is easily possible to make \$20 to \$30 a week or more in spare time. There are thousands of saws in every community to keep sharp. This business is a money-maker in both large and small towns.

"INDEPENDENCE AFTER 40" shows you how to get plenty of saws to file without canvassing, and after you get a start how you can develop into a general repair shop business also sharpening lawn mowers, skates, scissors, making keys, repairing vacuum cleaners, etc. Other men have made themselves independent—you can too! The way to do it is all planned out for you in this practical book—send for your free copy today!



#### Send Coupon for FREE BOOK

FOLEY MFG. CO., 719-8 Foley Bldg.,  
Minneapolis 18, Minn.

Send me free book "INDEPENDENCE AFTER 40"

Name \_\_\_\_\_

Address \_\_\_\_\_





## YOUR low cost ride to anywhere the **MARMAN** *TWIN*

the only bike motor  
with Extra  
Twin Cylinder Power

Get zooming getaway, easy 35 m.p.h. cruising, 90 miles per gallon from this revolutionary new form of transportation... high efficiency, minimum upkeep from 3 1/4 h. p. horizontally opposed 2 cycle design—only 5 moving parts. Auto type clutch for easy idling at stops, smooth acceleration, less belt wear... chrome plated tank muffler and pipes for top appearance on any color bike. • Easily installed on any man's balloon tire bike... fully guaranteed.

Factory Price \$129.50 plus tax

See your local dealer  
or use coupon

Interested dealers  
write:

**MARMAN**  
PRODUCTS CO. INC.

P. O. Box 89, Inglewood, California

- ☐ Send me one Marman Twin Motor with installation instruction. I enclose \$135.93 Check or Money Order which includes \$6.43 Federal excise tax.
- ☐ Send me further information and descriptive literature.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_

PS \_\_\_\_\_

## SAVE HALF ON 50" CIRCLE ESS FLEXIBLE SHAFT

Identical shaft which has sold and is selling everywhere for \$10.95. You SAVE almost HALF. Ideal for sanding, cleaning, polishing, buffing, drilling, grinding and scores of other jobs.

### Note These Features

Fits any 1/2-inch motor shaft. Head-piece has 1/2 inch by 20 thread arbor; will accommodate any internal threaded tool or adapter with same size thread or hole. 5/16-inch inner core, built of transverse wound, high-carbon steel wire; extremely strong and flexible. Steel end fitting insures durability. Outer flexible casing of high carbon steel wire wound in combination with a dead-soft filler wire. Double ball bearings in head piece and motor coupling. Ball bearing motor coupling assembly. 50 inch length. Simple, complete instructions.



ONLY  
**\$5.95**  
POST PAID

## 13 PIECE HIGH SPEED DRILL SET

### SENSATIONAL VALUE

Made of finest high speed steel. Complete set includes 13 straight shank drills (1/16"-5/64"-3/32"-7/64"-1/8"-9/64"-5/32"-11/64"-3/16"-13/64"-7/32"-15/64"-1/4"), plus sturdy Huot steel case with flat indexed panels, which stand up for easy selection when box is open. Sells regularly everywhere for \$5.95.



ONLY  
**\$3.95**  
POST PAID

## SAVE \$\$\$ ON THIS HANDY-HEAD GRINDING AND POLISHING HEAD

Every part highest quality. 1/4" JACOBS HAND-TITE CHUCK: TORRINGTON NEEDLE BEARINGS, 1/2" x 3/4" insure fast, smooth running; SPINDLE-hardened, bearing surfaces ground, 1/2" x 24 thread with 4 flanged nuts, holds up to 1" x 8" wheel; 2 1/4" V-Pulley, cut from solid piece of steel; FRAME—one piece, cast aluminum alloy. Can be driven from rear, above or below. Base 4" x 4"; height to center of spindle 6". Sells regularly for \$7.50. Only... Good in U. S. only. Send check or money order. No. C.O.D. SATISFACTION GUARANTEED

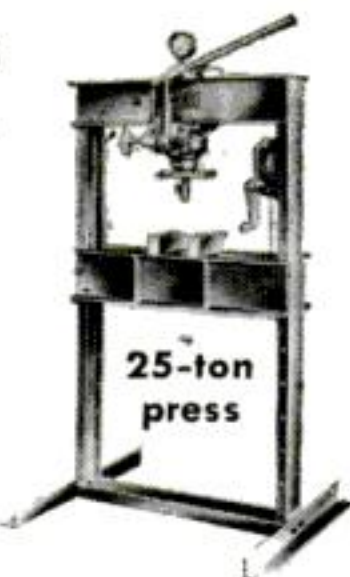


ONLY  
**\$3.95**  
POST PAID

**SURPLUS VALUE CENTER** 4602 St. Clair St.  
CLEVELAND 3, O.

## The Right Press will save you money

The right size press, chosen from the complete Dake line, will handle those hard jobs for you — pressing, straightening, separating, or bending. Up to 75 tons capacity. Manual, hydraulic, electric-hydraulic, or air-hydraulic operated. Send for free bulletin.



**DAKE ENGINE COMPANY**  
622 Seventh Street, Grand Haven, Michigan

## PRECISION WRIST COMPASS



Accurate. Sturdy. Dependable Compass that you're sure to have with you at all times because you wear it on your wrist. Looks like, feels like a fine wrist watch and just as handy. A reliable precision instrument in beautiful silvery brass case with latest style, non-breakable lucite crystal. Adjustable khaki strap of high quality, durable canvas. Precision made to give reliable service under severest usage. Your money back if not satisfied. C.O.D. Only \$2.00 plus postage or send \$2.00 and save postage. THRIFT PRODUCTS CO., Dept. A, 307 Fifth Ave., New York 16, N. Y.

## Build AIR-CONDITIONING UNIT FOR YOUR HOME

We show you how. It's easy to build and a pleasure to use. An individual unit that fits your window and really cools the room. Up to 18° cooler than outside. Real Air-Conditioning, not just a fan. Different sizes to fit any room. No expert knowledge needed. Mail \$1 now for complete simplified PLANS and valuable Catalog.

**LEJAY MANUFACTURING COMPANY**  
523 LeJay Building, Minneapolis 8, Minn.



## FREE! "HOW TO BUY AN OUTBOARD MOTOR"

Write for this 52 page book packed with facts on boats and motors. Tells you how to select the right one for your needs. Sent free. A postcard gets it.

### JOHNSON MOTORS

500 Pershing Road, Waukegan, Illinois  
Johnson Motors of Canada, Peterboro, Canada

## SAVE! ON POST LAMPS!

New Kits bring beautiful rugged colonial post lamps in reach of all craftsmen. Deluxe Kits \$7.95 and up. Send for FREE LITERATURE today. LORENZEN INDUSTRIES, Dept. PS-7, Niles, Mich.



## CROSMAN Silent RIFLE



**POWER  
without POWDER**

You'll like a Crosman because there is no recoil to spoil your aim... no noise... no odor... no cleaning! Rifled barrel for greater accuracy... adjustable power, too, for short or long range shooting indoors or out. Available in .177 and .22 cal. models.

AT YOUR DEALER OR WRITE DIRECT  
**CROSMAN ARMS CO., INC.**

9E HENRIETTA ST., ROCHESTER 7, N. Y.



## Sensational SHAPER CUTTER

### For Endless Molding Contour Designs



Employs exclusive double notched sets of full 1" and 1/2" split blades. Blades automatically held in position by notched design and in absolute alignment. No set screws to loosen; blades cannot fly out. Provides endless varieties of standard and special contours.

Specify type of spindle on drill press or shaper. Available in six standard adapter sizes. Ten-day money back guarantee. Complete literature on request.

**\$900** Complete with 3 sets of Hi-speed Tool Steel Cutters

### TOOLS FOR USE ON ALL DRILL PRESSES

ROTARY WOOD PLANERS  
ALL-METAL SHAPER FENCES  
SPINDLE ADAPTERS  
AUXILIARY DRILL PRESS TABLES  
**BARRON TOOL COMPANY, INC.**  
270 Architects Bldg.: Detroit 1, Mich.

ROTARY SURFACE SANDERS  
DRUM SANDERS

FREE  
Power Tool  
CATALOG

**BARRON** PRECISION WORK SHOP **TOOLS**



## BUILD LAWN FURNITURE EASILY - ECONOMICALLY!

with EASI-BILD\* Full-Size Patterns

With these new, full-size patterns, you can build lawn furniture to please the whole family. And the kids will get a kick out of their own child-size chairs. Simply trace the full-size pattern on the wood, saw, and assemble with CASCOPHEN, Casco's new, waterproof glue described below. \*Reg. U. S. Pat. Off. by Easi-Bild Pattern Co.

## How to choose a glue!

These directions will solve your gluing problems:



**For boats, outdoor furniture, sports equipment**—joints that must withstand outdoor exposure—Cascophen (Resorcin Resin Glue). The first completely durable glue available to homecraftsmen!



**For furniture, toys, heavy-duty home repairs**—strong, stainfree, moldproof, highly water-resistant Cascamite (Urea Resin Glue). Mixes quickly with cold water!



**For models, photo prints, labeling**—general home, school, or office gluing, use the new, clean, white, fast-setting Cascorez (Polyvinyl Resin Glue). Liquid ready to use!

Send Coupon for Furniture Patterns to

Casco Pattern Dept. P5-78,  
P. O. Box 215, Pleasantville, N. Y.

Enclosed is \_\_\_\_\_¢ for patterns checked below.

- ( ) Lawn Chair, Pattern #32-25¢  
( ) Miniature Lawn Chair, Pattern #132-25¢  
( ) Lawn Settee, Pattern #39-35¢  
( ) Please send free folder illustrating 100 patterns and free gluing chart.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

**THE BORDEN CO. • CHEMICAL DIVISION**  
Makers of Casco Glues

JULY 1948 249

## NU-WAY LAWN MOWER

Write for  
FREE Circular

Price **\$12.50**  
Why Pay More



Build Your Own  
Rotary Type Lawn  
Mower

We Supply Cutting Unit  
Complete.

NO INCREASE  
IN PRICE

**TRACTOR-LITE MFG. CO., SPIRIT LAKE, IOWA**

## Get This New TEMPLATE CATALOG Free!



Rapidesign Time-Saver Templates for engineers, draftsmen, architects, designers, office, store and factory layout.

Write for FREE catalog No. 48 to

**RAPIDESIGN, INC.**

Dept. PSM 78 Box 592, Glendale, Calif.

## LAWN ORNAMENT-NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25¢. Other patterns: 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10¢ each. 25 Novelty Patterns, 30¢. All 62 Full Size Patterns, \$1.00 Postpaid. Strother Pattern Service, Dept. 7-AG, Box 383, Belington, W. Va.

## RARE BARGAIN SLIDE VIEWER

for 2x2 slides

Was \$8.95  
Now only  
**\$3.49**

plus 30¢ for  
postage & handling. No  
C.O.D.'s.

Now! A precision LaSalle Viewer at a price you can't afford to miss! The exact viewer that's a best seller in stores coast to coast at \$8.95. Many high quality precision features. Perfect over-all illumination. Tilt regulator for greater viewing comfort. Self contained batteries. Beautiful, black, long life plastic case with silvery, smart contrasting trim. Complete with bulb and batteries at a price so low we're forced to charge for postage and handling.



Buy with confidence at  
**HABER & FINK inc.**  
Dept. P 12 Warren St. New York 7, N.Y.



# Woodworkers!! Make your circular saw the most versatile tool you own!

CUT GROOVES LIKE THIS

\$4.95  
SET

POSTPAID  
INCLUDING TAX



WILL  
NOT  
CHATTER

WARREN DADO SAWING WASHERS WILL FIT THE ARBOR OF ANY POWER CIRCLE SAW AND CAN BE USED WITH ANY DIAMETER SAW BLADE. CUTS GROOVES CLEANER, EASIER AND FASTER THAN ANY DADO CUTTER ON THE MARKET... MICROMATIC ADJUSTMENT PERMITS A CUTTING ANGLE CHANGE IN 15 SECONDS... SAW BLADE HELD RIGID... WILL NOT CHATTER... WARREN DADO SAWING WASHERS CAN BE LEFT ON THE ARBOR OR QUICKLY REMOVED FOR CUT OFF SAWING.

... ORDER YOUR SET OF FOUR WASHERS TODAY, TRY THEM FOR TEN DAYS, IF NOT SATISFIED, YOUR MONEY WILL BE REFUNDED IN FULL.

DEALER INQUIRIES  
INVITED



DADO SAWING WASHERS  
Warren

Arbor ☐ 1/2 ☐ 3/4 ☐ 1 ☐ 1 1/2 ☐ 2  
Sizes ☐ 3/8 ☐ 1/2 ☐ 1 ☐ 1 1/2 ☐ 2  
☐ Free Circular ☐ Check ☐ Money Order  
Name \_\_\_\_\_ Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_  
ALL SETS SHIPPED POSTPAID

WARREN DADO SAWING WASHERS CO.

P. O. BOX 98

NORTH END STATION

DETROIT, MICHIGAN

# DIE-LESS DUPLICATING

Many small parts can be formed without dies, to duplicated accuracy of .001" with DI-ACRO Precision Machines. — Benders, Brakes, Shears. Save die expense and time delay. Ideal for experimental and research work, making samples, models, etc. as well as regular production runs. Write for descriptive literature.

O'NEIL-IRWIN MFG. COMPANY

342 8th Ave., Lake City, Minn.



SHEAR



BENDER



BRAKE

## SHEETMETAL FORMING TOOLS



30" BRAKE. Forms angles, channels, vees, flanges, locks, zees. Handles 26 gage sheet steel, heavier gages of aluminum, copper, plastic, etc. Portable. Can be held in a bench vise, or bolted down. All steel construction. Wt. \$2450 40 lbs. Shipped exp. collect. ONLY \$2450



12" BRAKE. Fits in vise to form difficult and compound bends, up to 20 gage steel any length and width. \$12.50. 1P. 18" CURVE FORMER. Handles 16 gage steel 2" to 30" dia., \$9.50. SHEAR. Cuts 16 gage steel any length and width. \$18.50. VISE IRON BENDER. Forms rings, hooks, eyelets, etc. in 1/4" round or square; 1/4" up to 2" wide in bar iron. Price \$10.00 PP., with attachment to bend 1/2" pipe, \$12.50. SHEET METAL PLIERS. 2 1/2" wide, \$2.00; 5" wide, \$3.50. 20 page instruction booklet, 50c.



Immediate delivery. Order direct, cash or C.O.D., or send for folder.

Vise Brake Mfg. Co., 1318 So. 30th Ave., Dept. 56, Omaha 5, Nebr.

## NEW 1948

# Plastics Supplies Catalog

Just off press. Full details on Plexiglas, Lucite, rods, sheets, tubes. Acetates, cements, dyes, buffs, molding sets, tools, carving kits, accessories. Everything in plastics. Gives prices, sizes, colors, etc. Price 10c, stamps or coin, with ad for catalog.

PLASTICS MFG. & SUPPLY CORP.

Dept. S-7

4707 Euclid Ave.

Cleveland 3, Ohio

## ADJUSTABLE BICYCLE SADDLE BRACKET

New, adjustable Saddle Bracket lowers saddle for use by younger children. Brings saddle down and forward so younger feet can reach and operate pedals safely. Simple, safe, sturdy steel bar. Easy to install and attach saddle. Adjusts 26" bicycle to 24" size. For boys or girls models. Made in 1/2 inch and 3/4 inch diameters. Specify diameter desired. Postpaid anywhere in U. S. Money back guarantee!

ONLY \$1.00  
POSTPAID

Attractive Dealer Proposition. Write for Details.

CONNIE BERT CO.

8115 Clinton Ave., Cleveland 9, Ohio

## Treasure and Mineral LOCATORS



Low priced, unsurpassed in efficiency, lightweight models. Miniature batteries and tubes. Credit plan available. Free literature. Dept. PS-78.

FISHER RESEARCH LABORATORY Inc.,

Palo Alto, Calif.

# TX-5 GEIGER COUNTER for Locating RADIOACTIVE MINERALS

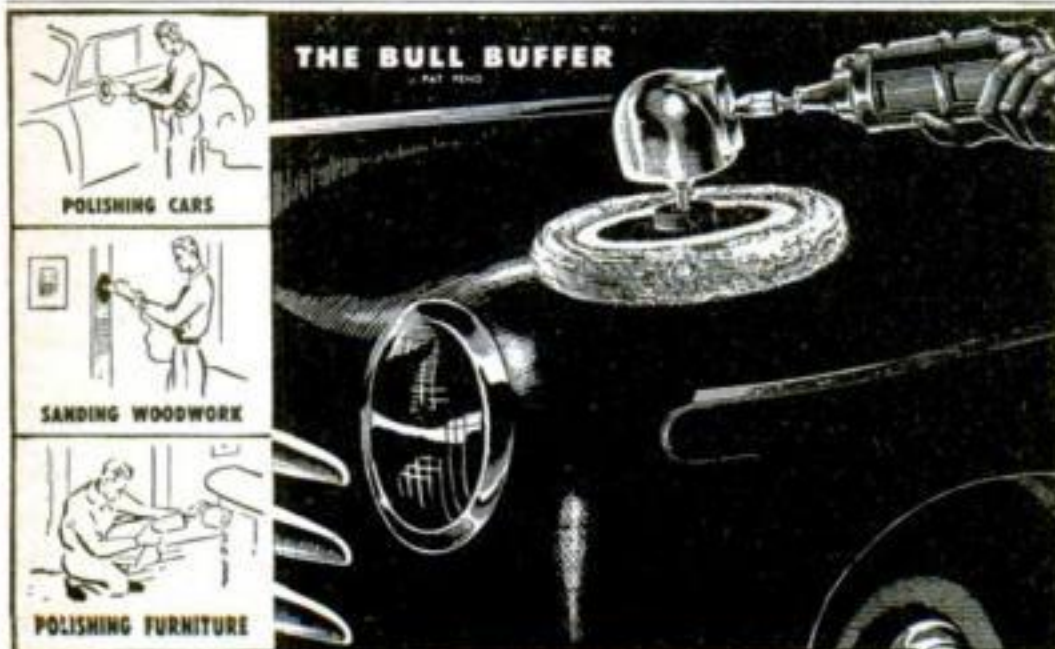
The TX-5 is light weight, battery operated. Locates deposits of radioactives. Simply switch "on" — clicks in headphones indicate presence of radioactives. Extra sensitive, yet ruggedly built.

Each unit comes complete with headphones, probe, batteries and manual. For prospecting and mining operations. Write for details and price. Address Dept. 2



Geiger Counters for every purpose...  
• OIL PROSPECTING  
• MINERAL LOCATION  
• HOSPITAL WORK  
• INDUSTRIAL USE

OMAHA SCIENTIFIC SUPPLY CORP., 3623 LAKE, OMAHA 4, NEBR.



THE BULL BUFFER

POLISHING CARS

SANDING WOODWORK

POLISHING FURNITURE

You polish and sand faster, easier—do beautiful, professional work—with this amazing new attachment for your hand drill. And the Bull Buffer more than pays for itself the very first time you make your car, floors, woodwork, furniture gleam like new.

The Bull Buffer fits any chuck on an electric drill (or flexible shaft). It's easy to use—the only buffer you can turn in a complete circle while you hold your hand drill stationary. Reaches all curved and flat surfaces. It's packed with power, built with lifetime materials and guaranteed.

The sooner you order, the sooner you'll have this tool of a hundred uses in your hands. It's a real bargain—only \$9.95, complete with five-inch rubber disc, sheepskin bonnet, and 2 sanding discs. (Extra bonnet, \$1.25; extra medium and coarse sanding discs, 10c each; wire brush attachment for removing paint, \$1.75) If your dealer doesn't stock, send cash, check, or money order for \$9.95, postage prepaid, C. O. D. plus postage.

\$9.95

Dealers, Write for Information

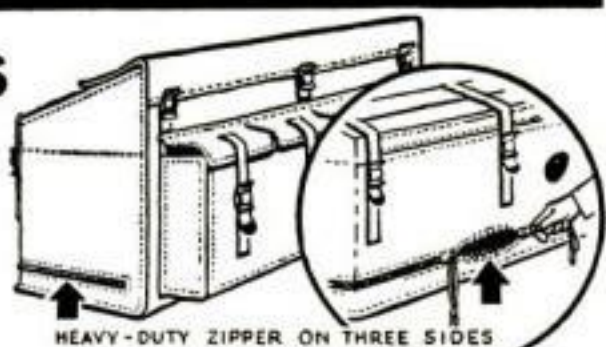
BERTRUM C. ENGINEERING CO.

3034 Main St.

Kansas City, Mo.



## TRAVELER'S UTILITY CARRYING CASE



HEAVY-DUTY ZIPPER ON THREE SIDES

**FOR FISHING! CAMPING! PICKNICKING!  
ROOMY! WATERPROOF! EXTRA COMPARTMENTS!**  
SATISFACTION GUARANTEED! New, U.S. Gov't. surplus. A vacation value made of rugged, waterproof canvas with lots of room to carry your equipment. More convenient than a trunk for storage. Easily attached to car or truck. Size: 30" x 13" x 17". Heavy duty zipper on 3 sides. Real buy at this price! Immediate delivery!

**\$4** Postage  
Prepaid  
In U.S.A.

Sorry, no C.O.D.'s

**MACHINERY & EQUIPMENT EXCHANGE, Inc.**  
3422 WEST FORT STREET DETROIT 16, MICH.



VETS. TAKE 10%  
NOT RECAPS

## TIRES

GENUINE DEMONSTRATORS  
98% ORIGINAL TREAD.  
GUAR. 18 MONTHS

	Triple Inspected
600-16	\$ 5.75
650-16	5.75
700-16	6.25
650-15	4.75
700-15	5.75
550-17	5.75
750-16	6.75
32x6 (8)	11.45
32x6 (10)	13.45
825-20	14.45
900-20	15.45

Send this ad.

750-20 SUPER \$13.45  
MILITARY TREAD  
GUAR. 20 MONTHS

## BLATT

BLATT BUILDING  
49th & Lancaster Ave.  
PHILA. 31, PA.  
Send Check or M. O. &  
Save COD Charges

## 1/4-TON ARBOR PRESS

Ideal for straightening, bending, light stamping, riveting, staking, production assembly and general presswork. Used ten years in plants and shops—bushings, cameras, reels, typewriters, instruments, light molding, etc. Grey iron castings. Height 7 1/2"; over table 2 1/2"; over base 4 3/4"; ram 5/16" x 7/16"; ram travel 2 1/4"; approx. pressure 500 lb. Weight 7 lb.

**\$9.50 POSTPAID U.S.A., MONEY-BACK GUARANTEE.**

**H. D. HERDER, Tool Specialties**  
2427 Brook Dr. KALAMAZOO 82, MICH.

## BUILD-ARC-WELDER

For Light or Heavy Work. 75-200 amps. No previous experience needed. Complete PLANS and valuable Catalog 35c.

**LEJAY MANUFACTURING CO.**  
1323 LeJay Bldg., Minneapolis 8, Minn.



## CUBIC-INCHER

## RADIO SET \$2.39

SIGNAL-POWERED  
NO ELECTRICITY



Entire set less than one cubic inch in size, rests in bowl of teaspoon! Radar 1N34 detector, world's best for crystal sets. Works anywhere—never wears out—costs nothing to operate. Safe and foolproof. Reception is guaranteed. With connecting leads and complete directions. \$2.39 postpaid without phone. \$3.19 postpaid with phone. Foreign orders 10% extra, prepaid only.

**CARING PRODUCTS** Dept. 52, Box 1308  
Chicago 90, Ill.

## Trouble Lamp



This fully guaranteed all rubber heavy duty *Trouble Lamp*, together with 25' Underwriters approved rubber cord, is for use with A.C. or D.C. current. Note switch and connection socket at base under heavy metal guard. Delivered anywhere in U.S.A., postpaid, \$3.00.

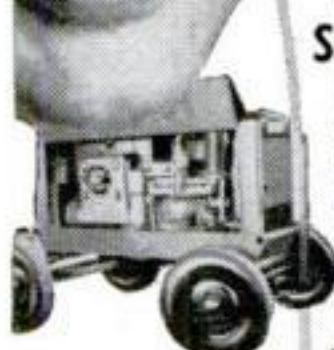
**SURPLUS SELLERS CORPORATION**  
Dept. A, 624 Madison Avenue,  
New York 22, N. Y.

# Earn Big Money! ...Arc Welding

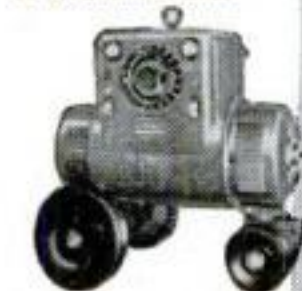


**NEW HOBART**  
A.C. Arc Welder  
and Power unit

You can even  
"Build Your Own"  
gas drive portable  
welder and **SAVE**  
**\$300<sup>00</sup> to \$500<sup>00</sup>**



Gas Drive Portable



Electric Drive Portable



20-200 A.C. Welder

## Small Investment Starts You

in the profitable arc welding business. All you need is a low cost reconditioned auto engine, chassis and Hobart generator to "build your own" portable unit. Easy to build and saves you \$300 to \$500 over cost of factory built job. Send for FREE instruction book today and get started immediately on the "Big Pay" welding jobs!

## Simplified in Operation

and it's no trouble at all to learn to weld with the Hobart "Simplified" Arc Welder. Practice makes you perfect.

## Hobart AC Arc Welders

are ideal for low cost shop operation and you'll want one later on for general shop use. Leaves your portable unit for "Big Pay" outside jobs.

## Hobart School of Welding

can teach you arc welding in a short time at low cost. Individual instructions by expert instructors. Qualified under G.I. Bill of Rights. Check coupon.

**Hobart** Bros. Co., Box P-78, Troy, O.  
"World's largest builder of Arc Welders"



• Yes, send me **free** instruction book on "How to Build Your Own Gas Drive Welder," and information and catalogs on the items I've checked.

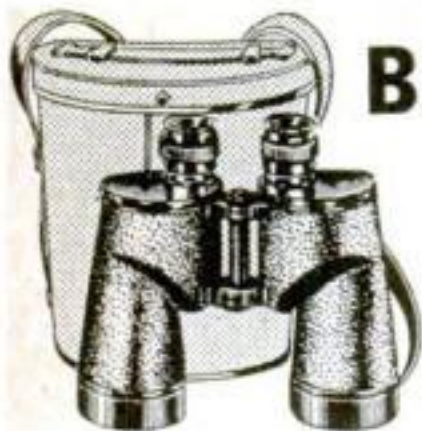
- ☐ Gas Engine Drive ☐ A.C. Welder  
☐ Electric Drive Welder ☐ Welding School

**HOBART BROTHERS COMPANY, BOX P-78, TROY, OHIO**

Name \_\_\_\_\_  
Address \_\_\_\_\_



# U. S. NAVY 7x50 PRISM BINOCULARS



with Coated Optics  
Used but in  
EXCELLENT CONDITION

**\$95.00**

Complete with leather  
carrying case and sling

6 x 30 U. S. Army Binoculars—M3 with coated optics. Brand new with leather case and sling straps. **\$57.50**

Field Glass, 4 x 40 Wollensak. Ideal for bird study. Brand New. **\$17.95**

New U. S. Government Surplus

## TRIPODS

Purchased by Government for engineers levels and transits. Adjustable to any height. Threaded head for levels or transits. Value \$75. **\$13.50**  
SPECIAL

## WHEATSTONE BRIDGES

Portable. Used, in excellent condition. Manufactured by Thompson Lever Mfg. Co., Philadelphia. Value \$150.00. **\$49.50**  
SPECIAL

## Engineers All Metal Army Type Hand-Sighting LEVELS

**\$2.00** PRECISION  
QUALITY



Send 25c for catalog of new and used guns, ammunition, binoculars and powder flasks.

## PUBLIC SPORT SHOPS

11 S. 16th St., Phila. 2, Pa.

No COD's



## ROLLER BEARING WHEELS

IDEAL for home use: garden and shopping carts, wheelbarrows, coasters, wagons, racers, etc. Heavy cushion rubber treaded tires. Baked cream enamel steel discs 10" x 1.25". 3 1/2 lbs.

SATISFACTION GUARANTEED.

Send Check or Money Order \$1.85 ea.

Set of Two \$3.55

Set of Four \$6.95

Postage  
Prepaid

## COLSON EQUIPMENT & SUPPLY CO.

1317 Willow St.

Los Angeles 13, Calif.

# A TOOLSHOP IN YOUR HAND



THERE'S ONLY ONE GENUINE HANDEE

First tool of its kind—today's finest. Smooth, steady power at your fingertips. Easy to handle. Make ship, plane and train models, bookends, costume jewelry. Grinds, drills, polishes, routs, carves, sands, saws, engraves on metal, wood, plastic, glass, leather, etc. 25,000 r.p.m. AC or DC. Wt. 12 oz. With 7 accessories \$20.50. In case with 40 accessories \$27.50. At stores or sent postpaid. A fine gift for a friend or yourself. CHICAGO WHEEL & MFG. CO., 1101 W. Monroe St., Dept. PO, Chicago 7, Ill. Free 52-page manual.

**HANDEE**

**TOOL OF  
1001 USES**

## Hydraulic Brake CONVERSION UNITS

FOR '32-'36 FORDS

Complete kit with all necessary parts for converting all four wheels to hydraulic brake system. Easy to follow instructions. Can be installed in 3-4 hours. Make your car SAFE. Money-back guarantee. Order TODAY—\$45.00. Send 10c illustrated catalog

ORDER DIRECT and SAVE

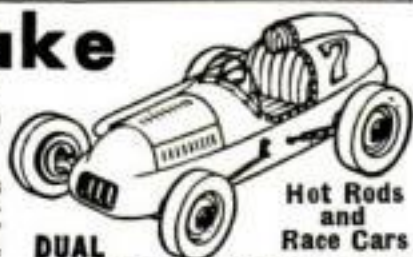
Check, money order, etc. 25% deposit on C.O.D.'s. Prices F.O.B. Los Angeles

ANSEN AUTOMOTIVE ENGINEERING

3801 W. Jefferson

Dept. PS-7

Los Angeles 16, Calif.



Hot Rods  
and  
Race Cars

DUAL MANIFOLDS, HEADS and CAMS for all makes and models. Meyers, Edelbrock, Sharp, Offenhauser, Weiland, Navarro and others. Guaranteed More Power and Speed. We specialize in quality speed and racing equipment.

## SPEED AND POWER HANDBOOK

Very latest methods! Construct your own superchargers, water injectors, compression heads, fuel saving devices—easily, practically without cost. Get racing speed, acceleration, dynamic power increases from any automobile! Build stock conversions! Fast roadsters. Hot-rod. Get ingenious formulas! Speed secrets! Also "Economy Information" Tuning techniques! Ignition! Carburetion! Mileage tricks. Illustrations! Including "Restyling Ideas"—Streamlining. Model revising! Customizing! Sport changes. Photographs! Parts lists! Drawings! ORDER TODAY. \$1.98 POSTPAID.

NEWHOUSE AUTOMOTIVE INDUSTRIES, 5941-A4 HEREFORD, LOS ANGELES 22, CALIF.



## MAKE BIG MONEY!

Be a floor surfacing contractor and sand both new and old floors. Sanders are easy to operate and better still, you're your own boss. Write for latest "tell-all" booklet entitled "Opportunities in Floor Surfacing" enclosing 25 cents in coin or stamps to cover handling.



## AMERICAN

FLOOR SURFACING MACHINE CO.  
332 So. St. Clair Street • Toledo 3, Ohio

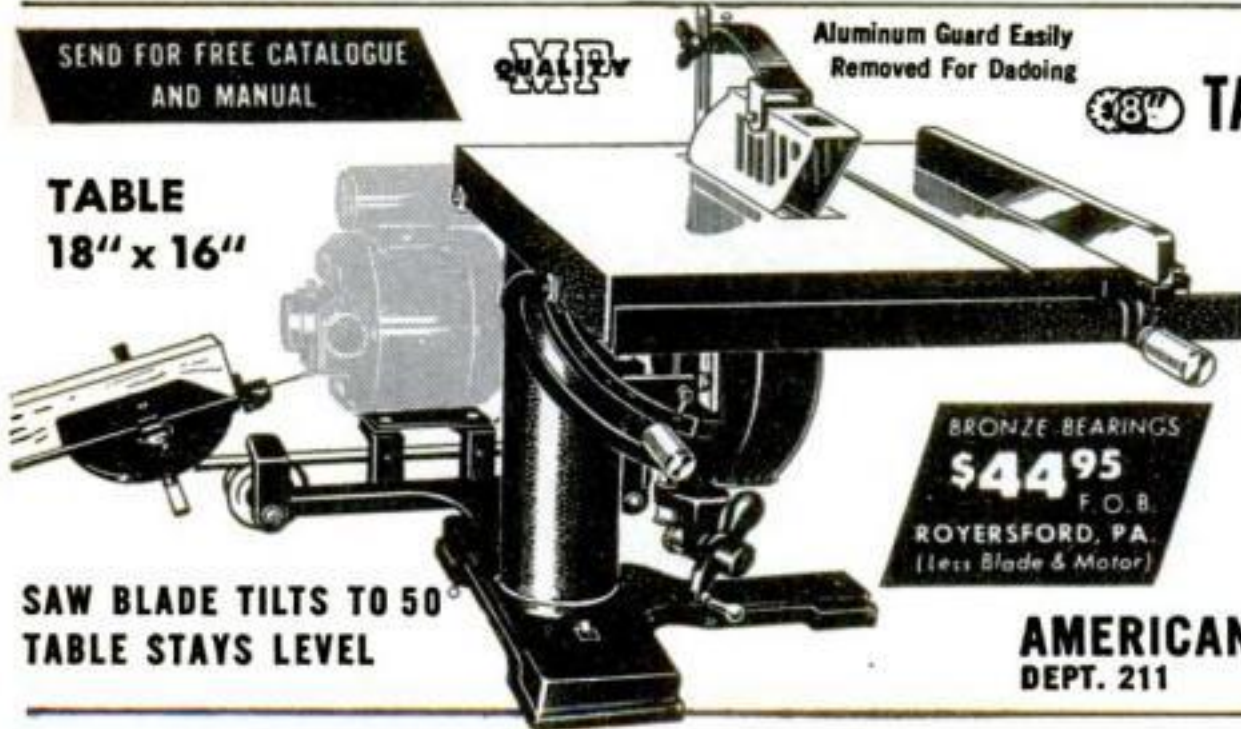
SEND FOR FREE CATALOGUE  
AND MANUAL

QUALITY

Aluminum Guard Easily  
Removed For Dadoing

8"

TABLE  
18" x 16"



BRONZE BEARINGS

**\$44.95**

F.O.B.  
ROYERSFORD, PA.  
(less Blade & Motor)

SAW BLADE TILTS TO 50°  
TABLE STAYS LEVEL

## NEW IMPROVED TABLE MODEL TILT-ARBOR SAW

OIL IMPREGNATED BRONZE BEARINGS OR DOUBLE SHIELDED BALL BEARINGS, BOTH WITH THE PATENTED BALL BEARING TRANS-AXIAL MOTOR DRIVE

MODEL #2021X AS SHOWN WITH COMPLETE MITRE GAUGE. Precision etched scales show angles on mitre gauge and saw cradle. STEEL BAR RIP FENCE. ALUMINUM SAW INSERT AND GUARD. STEEL SPLITTER. BALL BEARING TRANS-AXIAL DRIVE 3/8" GROUND ARBOR. "COMPO" OIL IMPREGNATED BRONZE BEARINGS WITH OIL CHAMBER AND CUP, (OR, DOUBLE SHIELDED BALL BEARINGS, \$5 EXTRA). TABLE 18" x 16". BUILT IN SWITCH. Depth of Cut 2 3/8". Shipping Wt. 110 lbs. Requires 1/2 or 3/4 H.P. Motor.

(BALL BEARING FLOOR MODEL WITH 18" x 32" TABLE INCLUDING EXTENSION . . . . . \$79.50)

AMERICAN MACHINE & TOOL CO., Inc.  
DEPT. 211  
ROYERSFORD, PA.



Bring Electrical Troubles "TO LIGHT" with

## BRACH TEST-O-LITE



APPLIANCES



MOTORS



FUSES

### The NEON glow

enables breaks, poor contacts, shorts, and defective electrical units to be located quickly in all circuits of 100 to 550 volts... indicates hot or grounded wires... tells AC from DC (and polarity).

Here's the ultra-convenient, time saving, modern tester for fuses, cut outs, radios, appliances, motors, outlets. Far superior to the ordinary, clumsy bulb. Operates one hundred per cent even on very minute current. The only pocket-size tester with Patented Safety Feature. Guaranteed for a lifetime.

95c at your local electrical dealer... or send \$1.00 to cover purchase price, mailing and handling.

L. S. BRACH MFG. CORP.

200 Central Ave. Newark, N. J.

## BUILD YOUR OWN FAN

One-piece cast aluminum propellers for cooling and ventilating.

Size	Polished	Unpolished	Bore
Inches 2 Blade 3 Blade	2 Blade 3 Blade	2 Blade 3 Blade	Inches
15	\$3.00 \$4.00	\$2.50 \$3.00	1/2, 5/8, 3/4
18	3.75 4.50	3.00 3.50	1/2, 5/8, 3/4
20	4.00 5.00	3.25 4.00	1/2, 5/8, 3/4
24	4.50 5.50	4.00 4.50	1/2, 5/8, 3/4

Write for pamphlet on larger fan blades, wire guards, fan bases, shutters, pillow blocks, exhaust fan frames, etc., shipped prepaid if money accompanies order. Dealers write for discount.

KLOPPENBORG ALUMINUM FDY., Dept. PS-78, Davenport, Iowa

## Save Money-Make Money with LARSON Leathercraft

For gifts or for sale—make easy-to-assemble leather items. Complete stock leathers, tools, accessories. Send ten cents for new catalog of 101 money-making ideas.

J. C. LARSON CO. 826 S. Tripp Ave. Chicago 24, Illinois

## BUILD AN ELECTRIC LAWN MOWER

Make this Battery-Driven, Rotary-Blade mower from an old auto generator and inexpensive parts. Cuts forward, backward, grass or weeds, any height. Plans complete, easily followed.

PLANS ONLY  
**35¢**  
WRITE TODAY

LEJAY MFG. CO., 823 LeJay Bldg., Minneapolis 8, Minn.

SAVE TIME, WORK, MONEY!

## SHAW "DU-ALL"

and "PEPPY PAL" TRACTORS

These rugged walking or riding tractors are ideal for farm, truck garden, orchard, poultry farm. Operate on a few cents an hour. A child can handle them.

DO DOZENS OF JOBS Both riding and walking tractors quickly and easily plow, cultivate, harrow, disk, bulldoze, spray, haul, grind, saw wood, etc. LOW FACTORY PRICES Buy direct or through your dealer. Year's guarantee!

RIDING TRACTORS 4 models from 5 to 12 1/2 H.P., 58 in. wheelbase, 36 to 52 in. wide, 24 in. plant clearance. Hand or electric starter. Walking Tractors 1 1/2 to 3 H.P.

FREE Illustrated folders giving complete details and price lists—write today!

5707 FRONT ST., GALESBURG, KANS.  
668PS NORTH 4TH ST., COLUMBUS, O.

## ANNOUNCING THE NEW 3" HUSKY VISE

SWIVEL BASE SUITABLE FOR MILLING MACHINE - SHAPER - GRINDER DRILL PRESS



... WHEN WE SAY THEY'RE STRONG WE MEAN

*Strong!*

- Graduated base—can be used plain or swivel
- Width of Jaws 3"
- Depth of Jaws 1"
- Opens with steel jaws 2" (hardened)
- Weight complete with crank 16 lbs.

- Large Acme steel screw contributes sturdiness and durability
- Four bolt and key slots are provided to attach the vise rigidly to the machine table so that work holding surfaces are at true right angles to the table.

Our modern production facilities enable us to produce hi-quality machine tool equipment at the lowest prices.

**\$18.80**

ORDER TODAY or write for complete catalog

MFGS. UNIVERSAL AND INDEPENDENT LATHE CHUCKS • MILLING MACHINE VISES • POWER HACK SAWS • DIVIDING HEADS • MAGNETIC CHUCKS • RECTIFIERS • DEMAGNETIZERS

L.W. CHUCK CO., 32 So. St. Clair St., Toledo 4, Ohio

...USE THIS COUPON FOR YOUR CONVENIENCE...

L. W. CHUCK CO.  
32 SOUTH ST. CLAIR ST.  
TOLEDO 4, OHIO

- ☐ Please ship one 3" Vise. Check or money order enclosed.
- ☐ Please send complete L-W Catalog.

NAME \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

## KAYAKS



AQUAMOBILE V-18

V-23 CRUISER

KAYAK BOAT CO. 703 R. WHITTIER ST. NEW YORK 59, N. Y.

## U-MAK-IT BOATS Easy to Build

Cut-To-Fit for Quick Assembly. Everything Complete plus Illustrated Instructions. No Experience Necessary.

Simple as A. B. C. SEND 25¢ POSTAGE (COIN) TODAY FOR 3 MONEY SAVING ILLUS. CATALOGS Showing all '48 Models (marine plywood) & construction details.



703 R. WHITTIER ST. NEW YORK 59, N. Y.



# NEW SERIES 16 IMPROVED NO-DRIFT FM in the Sensational 1948 MIDWEST RADIO.



5  
WAVE  
BANDS

Separate Chassis Like the Powerful Series 16 AM-FM Above, or Beautiful Radio-Phono Consoles Available

## The SYMPHONY GRAND RADIO-PHONOGRAPH AM-FM CONSOLE



A truly magnificent instrument that offers new, improved No-Drift FM, 5 Wave Bands, Automatic Intermix Record Changer that handles both 10" and 12" records, 14 1/2" Panasonic Speaker, and exclusive Midwest Tri-Magnadyne Coil System and Color-Ray Tone Selection. Luxurious Cabinets. Other Console and Table Models with Series 16, 12, and 8 Chassis.

EASY  
TERMS

30  
DAYS  
TRIAL

SEND FOR  
FREE  
Catalog

BUY DIRECT FROM FACTORY AND SAVE

FILL IN COUPON AND MAIL TODAY OR JUST  
SEND YOUR NAME AND ADDRESS ON 1c. POSTCARD

### MIDWEST RADIO CORPORATION

Dept. 24-Y, 909 Broadway, Cincinnati 2, Ohio

Please send me your new FREE 1948 Catalog.

NAME .....

STREET .....

CITY.....ZONE.....STATE .....



HARGRAVE

PRESS  
SCREWS



Hargrave Press Screws No. 36-T (left) and No. 36-W (right) are favorites for jig work and for dozens of other jobs in home woodworking shops. Screws are steel, 5/8 in. diameter, with 6 in. travel, "USS" thread. Tip, 1 1/4 in. diameter. Threaded Nut drives into 1 inch hole and is held firmly by two screws.

At Hardware and Mill Supply Dealers Everywhere.

Write for Catalog of Complete Line

1955 Waverly Ave.  
Cincinnati 12, Ohio

The CINCINNATI TOOL Co.



SAFE AS A HAND SAW  
JUST GUIDE IT!

More like magic than any tool you ever saw. Imagine an electric scroll saw only slightly heavier than a hand coping saw... a tool that takes no effort to run, no pressure to feed. Works at any angle—on big assembly jobs or on the tiniest piece you can hold in your fingers. Runs 7200 strokes a minute... so fast the blade seems to stand still. Sturdily built... only two moving parts... never needs oiling. Easily cuts intricate designs—so smooth it eliminates sanding. Novice or craftsman, a thrill awaits you when you get a Moto-Saw in your hand.

THOUSANDS OF  
SATISFIED USERS

U.S. Patent 2233862  
Other Patents Pend.

DREMEL MFG. CO.  
Dept. S-128-g  
Racine, Wisconsin

Only \$5.85  
(with 3 SawBlades)  
Postpaid

No Limit to Length of  
Stock it Will Cut. Saws  
to Center of 19" Widths.

It's fast... cuts on an average of 1 ft. per minute up to 3/4" medium hard wood. Operates on 110-120 V. 50 or 60 cycle alternating current. If your dealer does not yet have Moto-Saw, send \$5.85... we'll pay postage. Or send \$1. pay postman balance plus postage. MONEY BACK if not delighted after 5 days' trial

## 20 ft. OUTBOARD CRUISER

From \$5.00  
to \$10.00

with Booklet fully detailed  
Large Scale Plans and Layout Procedure



135 Cu. In. Hydroplane — \$3.00  
10' Outboard Hydroplane — \$3.00  
FRANK J. SCHMID  
952 Anderson Avenue  
Bronx 52 N. Y.

Jiffy Jr.  
ELECTRIC  
HEATER

BOILING HOT WATER IN A JIFFY!!



Only \$2.95  
HOT WATER  
IN A JIFFY  
plus twenty five cents for postage

Place the Jiffy Electric Water Heater into the water and insert the plug in the nearest electric wall or light plug. You will have hot water in less than five minutes for baby's bath, your washing, shaving and a great many other uses in the home, camping, business, and on the farm. Mailed complete, including six feet of rubber covered wires and plug. One year guarantee. JIFFY ELECTRIC COMPANY, Dept. W6, 21321 Stephenson Highway, Hazel Park, Mich.



Free Sample!

Be the first to sell amazing, new GLOW IN THE DARK house numbers, switch plates, pictures, decals, religious articles, etc., etc. Represent a large manufacturer. Wonderful opportunity. BIG PROFITS. Write at once for FREE SAMPLE. MADISON MILLS, Dept. G-5. 303 Fourth Ave., New York 10, N.Y.

Say You Saw  
It In Popular Science

NOW AVAILABLE

6 FOOT  
FOLDING  
RULE



Accurate 6-foot folding rule with sure-lock joints. Solid black calibrations on sturdy, satin-finish aluminum. Clear, distinct readings. 1/16-inch divisions with 1/32 divisions on first inch. Rust-proof rivets at all joints. Folds to 7-inch length. Sent postpaid on receipt of \$1.00. You take no risk. Satisfaction guaranteed. Money cheerfully refunded if rule is returned within 5 days. Order NOW.

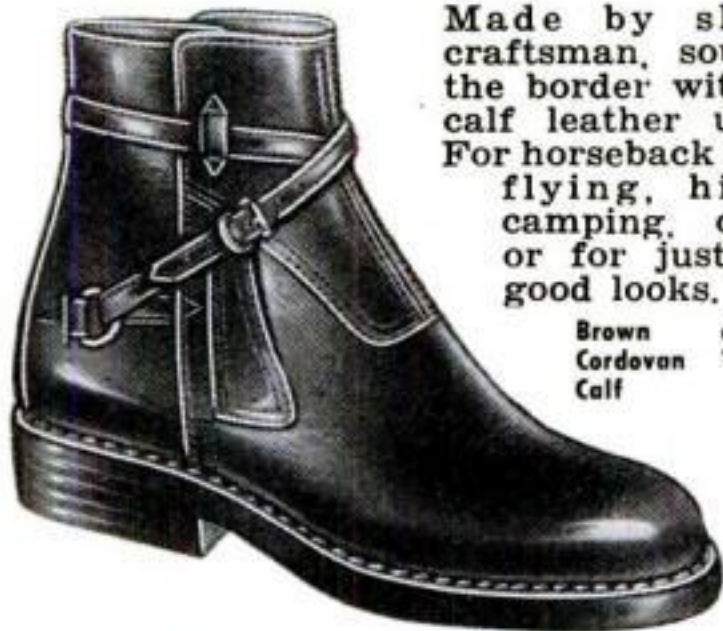
HESSE & CO. 77 W. WASHINGTON ST.  
CHICAGO 2, ILL.

\$1.  
Postpaid



# SPORTSMAN JODPHURS

THE SHOES ALL ACTIVE MEN WANT



Made by skilled craftsman, south of the border with soft calf leather uppers. For horseback riding, flying, hiking, camping, cycling or for just plain good looks.

Brown Cordovan Calf **\$18**

When ordering specify exact street shoe size for perfect fit. Money Back Guarantee. All shoes prepaid when cash accompanies order—otherwise shipped C.O.D.

**CHICAGO SPORTSBOOT CO., Dept. S1**  
209 W. Jackson Blvd. Chicago, Ill.



## SUPER HAM-R-ADZ

Tool steel attachment quickly converts any hammer into efficient adz or hatchet. Easy to use. Fits pocket. Ideal for carpenters, gardeners, campers. Only . . . . . each

## SUPER SQUARE GAGES

Precision fixtures clamp on carpenters' steel squares. Ideal for laying out stair angles, etc. Precision-made. Light weight. Brass thumb screws. Only **75c** Pair At Dealers or Postpaid.

A. D. MCBURNEY  
939 W. 6th St., Dept. PS-7, Los Angeles 14, Calif.



## New enlarged book of California Homes of CONCRETE BLOCK only 50c

Planning a home? Here's a book you need. Wide variety of architect-designed house plans for 1-2-3-4 bedroom residences in illustrated brochure. All styles of architecture. Many exteriors and floor plans to choose from. (Complete plans & specifications, fully engineered, are available at low additional cost.) Concrete block homes are easy to build; cheaper, fireproof, termiteproof, earthquakeproof. Give better insulation against sound, heat or cold. Send **50c** cash, check, etc., for plan book. We pay postage.

**BROWN & TREADWAY**  
2412 West 7th St., Section P, Los Angeles 5, Calif.



## CAR BATTERY TESTER

Checks voltage of individual storage battery cells under operating conditions. Red, yellow, and green areas indicate satisfactory or unsatisfactory operation while under load, no load, or charging. Calibrated scale 0-3 volts. Will check flashlight or #6 dry cells. 2 3/4" square. **\$2.00** postpaid

Stock No. MVD-25  
**DUBIN ELECTRONICS CO., Inc.**  
Dept. PS-7, Box 68, Corona, New York

# WAR SURPLUS OPTICAL BARGAINS

## ASSEMBLE YOUR OWN BINOCULARS!

Save More Than 1/2 Regular Cost



## GOVERNMENT'S 7x50 BINOCULARS

Complete Optics!  
Complete Metal Parts!  
We supply Full Instructions

**METAL PARTS**—Set includes all Metal Parts—completely finished—for assembly of 7 X 50 Binoculars. No machining required. Bodies have been factory hinged and covered. A sturdy Binocular Carrying Case is optional with each set of Metal Parts.

Stock #842-N . . . . . **\$39.40**

Postpaid, plus \$4.80 for Case—Total . . . . . **\$44.20**

**OPTICS**—Set includes all Lenses and Prisms you need for assembling 7 X 50 Binoculars. These are in excellent condition—perfect or near-perfect—and have new low reflection coating.

Stock #5102-N . . . . . **\$25.00** Postpaid

**NOTICE!** If you buy both Binocular Optics and Binocular Metal Parts, add 20% Federal Excise Tax to above prices.

## ARMY'S 6x30 BINOCULARS

**COMPLETE OPTICS & METAL PARTS**—Model M-13A1, 6 x 30 Binoculars (waterproof model). Everything you need—ready for assembly. When finished will look like a regular factory job costing \$102 to \$120. The Optics are new, in perfect or near-perfect condition. Have new low reflection coating. Metal Parts are new and perfect, all completely finished. No machining required. Bodies factory hinged and covered. Complete assembly instructions included.

Stock #830-N . . . . . **\$40.00** Postpaid,  
plus \$8.00 tax—Total—**\$48.00**

## TERRIFIC BARGAIN—BUBBLE SEXTANTS

These Army Air Forces Bubble Sextants cost Govt. about \$125 each. Bargain at our price of \$12.50. Wooden carrying case included. Wartime used but **COMPLETELY REPAIRED AND COLLIMATED**. Return within 10 days for full refund if dissatisfied. Directions for use accompany shipment.

Stock #924-N . . . . . **\$12.50** Postpaid

Same SEXTANT as above, but **BRAND NEW** and with Automatic Averaging Device and Illuminated Averaging Disc for nighttime use. Govt. cost \$217. Perfect working order guaranteed.

Stock #933-N . . . . . **\$22.50** Postpaid

**6 POWER GALILEAN TELESCOPE**—(Commercial Surplus) 28mm dia. Achromatic Objective Lens. Sturdily constructed of Aluminum. 7" long, extends to 9". Complete with carrying case.

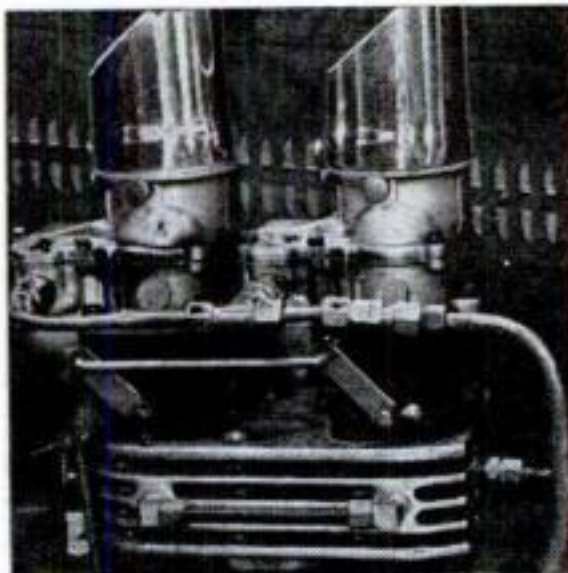
Stock #941-N . . . . . **\$3.00** Postpaid

We have literally millions of war surplus lenses and prisms for sale at bargain prices ranging 10c and up. Write for Catalog "N" — Sent Free!

Order by Stock No. Satisfaction Guaranteed

## EDMUND SALVAGE COMPANY

P. O. AUDUBON, NEW JERSEY



Sensational  
**MANI-DAPTOR**

## TWIN CARBURETION UNIT

**NOW AVAILABLE!** Mani-Daptors for immediate installation, complete with linkage and easy-to-follow instructions.

8 cylinder cars **\$26.50**  
POSTPAID

6 cylinder cars **\$32.00**  
POSTPAID

Chrome Stacks  
**\$1.25 ea.**

Finned Stacks  
**\$2.00 ea.**

Velocity Stacks and Carburetors extra

ORDER DIRECT • DEALER INFO ON REQUEST • FREE FOLDER

**L. B. BACKUS, 10617 Prairie Avenue, Inglewood, Calif.**



AIRCRAFT

# GALLEY STOVE

NEW  
**\$19.95**  
EACH



ARMY  
SURPLUS  
ITEMS

Operates on 110 and 24 volts. Fine for trailers, boats, camps, etc. Includes steam table, hot cup, and grille. New, complete with all accessories.

## SERVO UNIT

Control for the automatic pilot. Makes good hoist or water pump. Operates on 24 volts. New, complete with 1/4 H.P. motor.

**\$4.95**  
EA.

## MOTOR & GEAR ASSEMBLY

Adaptable for garage door openers, electric hoists, rotating radio beams, etc. Lifts 2800 lbs. Operates on 24 volts. New, complete with 1/8 H.P. motor.

**\$4.95**  
EA.



## LIGHT FIXTURES

New, complete with bulb. Operates on 110 volt.

**2 FOR \$1.95**

All prices F.O.B. Detroit. Send cash or money order. No C.O.D.'s—Orders shipped by railway express.

# RADIO CENTER

2530 E. Davison

Detroit 12, Mich.

Sensational  
Value!

## PAINT SPRAYER WITH ELECTRIC MOTOR

### DOES ALL ORDINARY PAINT SPRAY JOBS

Positively unheard of 'til now—an electric powered sprayer outfit at such a low price. Not a toy! Not a makeshift. It's a real, practical all-purpose sprayer outfit complete with compressor, 110 volt A.C. or D.C. electric motor, suction type, continuous flow spray gun, paint container, 10 ft. air hose, 6 ft. electric cord and plug. Use it for home shop, auto and 'round the house jobs, and do a good job—quick. Rush order today. Only \$19.95 complete. Send check or M.O. If C.O.D. send a five dollar bill for deposit.

Uses  
Lacquers,  
Varnishes,  
Paints, Etc.



Complete  
Only  
**\$19.95**

Weights Only 8 lbs.  
Portable. Use it Anywhere

HOME SHOP PRODUCTS CO.

Dept. 2-B

4821 Sheridan Road

Chicago 40

256 POPULAR SCIENCE



# "YANKEE" VISES

hold work through every step  
without a misstep

Any job locked in a "Yankee" Vise, is correctly positioned for every operation . . . hand or machine. Lifts on and off swivel base at bench. Machined accurately . . . top, bottom, sides and front end . . . V-grooved block for rounds. Four sizes, with and without swivel base . . . 1 1/2", 2", 2 3/4" and 4" jaw widths. At your dealer's.



Write for  
"Yankee"  
Tool Book

NORTH BROS. MFG. CO.  
Philadelphia 33, Pa.

YANKEE TOOLS NOW A PART OF  
**STANLEY**  
THE TOOL BOX OF THE WORLD



## WORLD'S LOWEST PRICED ADDING MACHINE

IDEAL FOR BUSINESS OR PERSONAL USE—GUARANTEED ACCURATE. Not a toy. Operates with only a finger flick. Adds, subtracts, multiplies, divides. Counts up to one billion. Pays for itself over and over. Ideal Gift—for Business, Income Tax and School use. MONEY BACK GUARANTEE. Send name and address. Pay postman only \$2.95 plus postage. (Send full cash if outside U.S.) Beautiful rich-looking Leatherette Case included at no extra cost. Money back in 10 days if not delighted. AGENTS WANTED.

Calculator Machine Co., (Mfrs.) Dept. 502, P.O. Box 248  
Glenview, Illinois



## A PENNY POSTCARD MAY CHANGE YOUR FUTURE...

Get full information on the coin-operated vending machine industry. Start with a few machines and build a wonderful future. We'll give you complete advantage of our "know-how." Send for Free Booklet Today—No Routes Sold!

## PIONEER VENDING SERVICE

ADDRESS ALL MAIL TO DEPT. PS

461 SACKMAN ST. • BROOKLYN 12, N. Y.

## EYE GLASSES BY MAIL

INCLUDED: Eye Glass Case, Wiper, Eye Glass Cleaner with each order! 30-DAY TRIAL OFFER. NEWEST STYLES. POSITIVE MONEY-BACK GUARANTEE. Write today for FREE Catalog, Low Prices, Scientific Sight Test Chart!

Broken Lenses Replaced — 48-Hr. Service.

LEE EYE GLASSES CO., Dept. Q-9  
4148 Easton - St. Louis 13, Mo.

SEND NO MONEY



LOW AS  
**\$1.95**  
AND UP

Say You Saw  
It In Popular Science

## RUPTURE SUFFERERS GET RELIEF



Get comfortable, safe relief with scientific support. Soft, sanitary material gives natural support with real comfort to active wearers. Satisfaction guaranteed. For free literature write:

**WEB TRUSS CO.**

Dept. S-8, Hagerstown, Md.



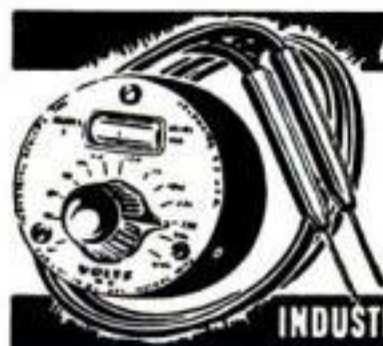
## NEW TYPE PIPE CLEANERS

Twenty cleaners in handy plastic case. Easy to carry, and use — Roll out; break off. Get Rolas at your dealer or send 10c for sample.

*Rola*

NUPAK PIPE CLEANER CO.  
BOX 326, PASADENA  
CALIFORNIA

ACTUAL  
SIZE



### FLASH THAT VOLTAGE

Turn that knob. Extinguish the neon glow. Instantly read voltage off dial. MINI-VOLT model 400B measures 65 to 660 V. AC. Also DC. Tells AC or DC. Virtually burn-out proof. Guaranteed for 10,000 hours. 12" test leads. A "must" in electrical and radio work. At dealers or postpaid \$2.50. (C.O.D. 25c extra.)

INDUSTRIAL DEVICES, INC., EDGEWATER 2, N. J.



### POST LANTERN

ONLY \$7.50

17" high, 8" wide for 3" post. Equipped with lamp, chimney, and flame type bulb. Finished in Flat Black

LAKE STATE STEEL PRODUCTS  
OTSEGO 1, MICHIGAN

Prepaid in U. S. when remittance accompanies order—otherwise C.O.D.



### YOU CAN BUILD anything on wheels!

**KIT A**—Contains 2 steel wheels (18" x 1 1/4") with moulded rubber tires, 1 steel yoke with welded axle, 2 steel brackets, and plated nuts. Stands up to 1000 lb. load. \$3.95

**KIT B**—Contains 2 steel wheels (15 1/2" x 1 1/4") with moulded rubber tires, 1 steel yoke with welded axle, 2 steel brackets, and plated nuts. Stands up to 475 lb. load. \$2.95

Build your own soapbox racers, wheelbarrows, toy wagons and carts, utility trucks, bike trailers, etc. with the new **PALMER COMPLETE WHEEL KIT**. Everything complete: 2 sturdy, steel, molded rubber tired wheels, bright red baked enamel finish; 2 steel brackets; 1 steel yoke, welded axle; rustproof; plated steel nuts; easy to assemble, complete instructions. Stands up to 1000 lb. load. Send check or money order. Shipments F.O.B. Cleveland 9, Ohio.

FULL MONEY BACK GUARANTEE

CONNIE-BERT CO. 8115 Clinton Rd., Cleveland 9, Ohio

## BARGAINS OF A LIFETIME!

### PISTON TYPE AIR COMPRESSOR

Piston type, size 2 x 1 3/4, head in valves, bronze bearings, splash lubrication, "V" Belt drive. Intake muffler and cleaner. Capacity 2.8 c.f.m. at 100 lbs. continuous pressure or 150 lbs. Intermittent, with 1/2 HP motor. Can be used with 1/4 HP or 1/3 HP at lower speed. Weight 14 lbs. Operating instructions furnished.



Immediate delivery. **\$18.50**  
Price only



### 1/4" REDUCING VALVE & GAUGE

Oil resistant, pressure 0-to-200 lb. Reduced pressure 0-to-75 lb.; 3 outlets 1/4". Wt. 2 lbs. **\$5.75**



### DASH POT CHECK VALVES

Prevent leakage after compressor stops. 1/4" Check Valve..... **\$2.50**  
1/2" Check Valve..... **\$4.25**



**AIR GAUGE**  
Standard air gauge. 2 1/2" diameter. 0 to 168 lbs. 2" diam. 0 to 200 lbs. pressure.... **\$1.75**



### POP TYPE VALVES

Has a close range of closing after pop-off pressure is reached. 1/4" pipe thread. Only..... **\$1.50**



### AUTOMATIC PRESSURE SWITCH WITH UNLOADER

125-150 lb. pressure. Uses 1/4 to 5 H.P. unit. Only **\$8.95**

## MOTOR BARGAIN \$2.45



**USE AS 6 VOLT GENERATOR**—Generate your own power. Can be operated on your bicycle wheel. Furnishes sufficient power for two 6 volt bulbs. Resistor furnished free with each motor enables you to maintain constant voltage. Special Price **\$2.45** or 4 for \$7.50, or 24 for \$36.00.

1/30 HP 24 volt DC motor 2450 R.P.M. .95 amps. 1/4" shaft size overall 3"x4". Weight 3 lbs. Also operates on 32 volts, only

**\$2.45**

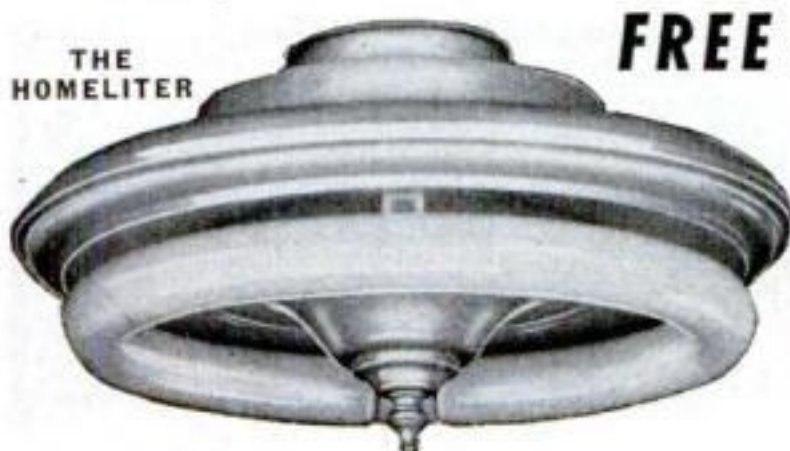
**PRICES ARE F.O.B. CHICAGO. Immediate delivery. SOLD ON MONEY BACK GUARANTEE. Send check or money order today.**

**C & M EQUIPMENT COMPANY** 1831 S. State St., Dept. B-7 Chicago 16, Ill.

Say You Saw  
It In Popular Science

## 22 Big Money-Makers in a Single Line! Amazing New Fluorescent Lights with CIRCULAR TUBES

THE  
HOMELITER



### FREE SALES OUTFIT

● Don't send a penny. Sample Outfit is FREE. Rush name on penny post card for money-making facts about sensational new "CIRCLINE"

Fluorescents. Latest scientific development gives you 22 new type circular tube fixtures for kitchens, dinettes, halls, and play rooms. Also Floor and Table lamp for living rooms and pin-ups for shaving and vanity tables. Sells on sight to homes, restaurants, stores, offices. No other fluorescents like CIRCLINE. Salesmen who order samples quickly reorder in large quantities. All fixtures complete with tubes. No waiting. Also immediate delivery on all standard type Fluorescent Fixtures. This is too good to miss. Big, quick profits waiting. Rush name on post card today for FREE Sales Outfit.



NEW MAXILUME  
PIN-UP  
MIRROR LIGHT

MAXILUME COMPANY • 125 W. Hubbard • Dept. 96 • Chicago 10, Illinois

JULY 1948 257





## PHOTOFLASH KIT ■ ■ ■

Replaces \$2000  
worth of Regular Flash Bulbs

BRILLIANT,  
PROFESSIONAL  
STUDIO-TYPE  
ILLUMINATION.

Brand new **STROBOFLASH KIT**, including 2 LAMPS, POWER SUPPLY, REFLECTORS, ACCESSORIES and COMPLETE INSTRUCTIONS for immediate 12-volt DC operation or 110-volt AC conversion. Yours for ONLY

**\$59.50**

**POWER SUPPLY** in attractive grey finish steel case, including relay control, two 50mfd 2000-volt condensers (110 Watt seconds light output). For immediate 12-volt DC use or simple 110-volt AC conversion. (Power pack alone worth double the price).

**ULTRA-BRILLIANT FLASH TUBES** in unbreakable sealed plastic give 12,000,000 peak lumens, over 15,000 flashes.

**PLUS** aluminum reflectors, transformer, connectors, cabling, instructions and 110-volt AC conversion price.)

Strobo-Lamps with reflectors ea.....\$10.95, 2 for \$21.00

Flash condensers 15mfd, 2000V INT..... 4.50

25mfd 2000V INT.....\$7.95; 8mfd 3000V.....4 for 11.95

**SPECIAL!** Just received . . . 16mm film, Weston Speed 50, 25-ft. rolls, 5-1 rolls per sealed can. '46 date.....\$19.95

**"TAB"** Dept. 7PS, Six Church Street **"THAT'S"**  
New York 6, N. Y., U. S. A. **"A BUY"**

## ???? WHY WASTE TIME HUNTING????

We have for immediate delivery genuine parts for all makes and models, 4x2-4x4-6x4 and 6x6. All models from 1/4 ton to 20 ton. All makes: Jeeps, Fords, Chevrolet, GMC, Studebaker, Reo, Auto Car, Federal, Diamond T, Brockway, Blerdeman, Macks, Oshkosh, White and Sterling.



Special Discounts To Fleet Owners on Above Parts

## PARTS FOR DODGE ARMY TRUCKS This Months Specials

These low prices are in effect for this month only. To acquaint you with our service we offer the following:

### MANIFOLD GASKET SET

For all Dodge Military trucks, '42 Plymouths and other civilian models; complete set (7 gaskets). Part No. 1056065 — supersedes #780460. List price, set 20c 45c. Our price..... 20c  
Lots of 100 sets, each... 15c

### PISTON RING SETS

For all model Dodges with 3 1/4" bore. All Dodge military trucks, '42 Plymouth and other civilian models. Specify year and model. Available in .020 — .030 — .040 — .050 — oversizes. List price \$8.05. Our price.... \$1.95

### CARBURETOR REPAIR KIT

For Dodge 3 1/2 ton Army trucks equipped with Zenith carburetors. Complete overhaul kit contains 29 different parts. Part #925481. List price \$6.00. Our price.... \$3.25  
We have a full stock of parts for all models Dodge Army Trucks.

Write for Dodge Parts List.

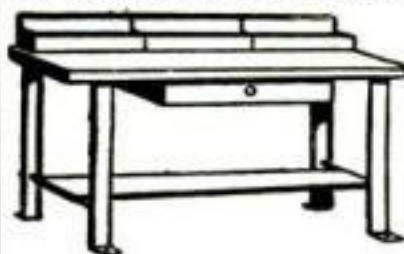
FOB, K. C., Mo. 25% Deposit Required on COD Orders.

**UNITED AUTO PARTS CO., INC.**  
1901 TROOST KANSAS CITY, MO.

258 POPULAR SCIENCE

## Heavy Cast Aluminum Blower Now Only \$10.00

**SINGLE EXHAUST BLOWER** DELIVERS APP. 100 CU. FT. AIR PER MINUTE. Ready to install yourself with any household tools. It's built for that. Housing is solid cast aluminum to last indefinitely. 110 V., A.C., 50-60 cycles. Cont. duty motor.



## DOUBLE EXHAUST BLOWER Only \$15.85

On Blowers, add 50c for handling; \$1 west of Mississippi.

## WORK BENCH WITH ALL WELDED STEEL LEGS

**ONLY \$15.35** F.O.B. Yonkers Ideal for Mechanics, Hobby Shops, Craftsmen

A super value! Legs are welded steel. Top is 2" solid plank stock. Bottom shelf is 1" pine. Large, roomy tool rack and bins for nails, nuts, bolts are pine, 32" high, 60" long x 23" wide with lower shelf and big drawer. Wt. approx. 100 lbs. . . . Shipped KD with bolts, nuts, screws for easy assembly.

**ALL PRODUCTS CARRY MONEY-BACK GUARANTEE!**

Send check, money order. Free literature.

**UNIVERSAL YONKERS CORP., (5-7) 137 Alexander St., Yonkers 2, N. Y.**



## GEN'L INDUSTRIES RM-4 MOTOR

Heavy duty 110V, 60 cycle shaded 4-pole induction type; .65 amp. Silent operating for WIRE, TAPE or DISC RECORDING, FANS, HEATERS, etc. Approx. 1750 RPM, 5/16" O.D. shaft, 3 3/8" sq. x 2 3/4". Less turntable, mtg. plate & reduction drive 4.95

**BLOWER FAN.** 4-3/16" O.D. 8 scoop blades (1 1/4" wide) pass terrific volume of air. Sturdy one piece cast aluminum. Ideal for 49c

**VENTILATORS, HEATERS, VACUUM CLEANERS, etc.** . . . . . 98c

**POWER CONTROL UNIT.** 25 watt—350 ohm rheostat mtd. in weather-proof metal case (3 1/2" sq. x 3"). Ceramic insul. bronze pointer knob. Tapered hole 1 1/4" to 5/16". Shpg. wt. 4 lbs. ONLY. . . . . 98c

**ALNICO MAGNETS—EXPERIMENTAL KIT** containing 10 asstd. powerful Bar, "U", Circular, Block, etc., for every purpose. . . . . 8

Write for Latest Illustrated "Alnico Magnet" Supplement.

**P-23 HEADPHONES.** High impedance type. Leather covered, adjustable, 5 ft. cord & PL-55 plug. 1.49

With rubber cushions. . . . . 1.49

Get on our mailing list—Always something new. 20% Deposit Required on C. O. D's

**LEOTONE RADIO CO., 67 Day St., N. Y. 7, N. Y.**

## "PLASTICS"

Work in a fascinating and profitable hobby. Just out—our latest fabricating manual. Tells you how to work with Plastics. Our new Catalogue provides all needed materials: Plexiglas—Lucite—Tenite—Catalin—Acetate—all in sheets, rods, and tubes. Complete line of cements, dyes, accessories and supplies. Send 20c today for Fabricating Manual and Catalog.

**HOUSE OF PLASTICS, 8648 Linwood Avenue, M. O. Dept., Detroit 6, Michigan**

## POWER MOWERS

Save up to 75% by assembling TRIANGLE'S

1948 Master Kit on a plywood base and have one of the finest power mowers money can buy.

**KIT** consists of heavy cast aluminum ball bearing center post, 18" or 20" tool steel blade; one 8" semi-pneumatic B.B. wheel with cast aluminum swivel unit complete; two 10" heavy duty semi-pneumatic B.B. rear wheels and axle; plans and instructions. **SPECIAL FACTORY PRICE... \$28.75**

For complete plans and instructions only for building TRIANGLE'S Master Mowers send 25c.

Also complete TRIANGLE Master Mowers ready to mow, at factory prices. Send for free literature on complete mowers, kits, parts, engines, wheels and other items.

For prepaid shipment add 10%. Your money refunded if not satisfied. **TRIANGLE MANUFACTURING CO., Dept. S, Box 185, Fort Scott, Kan.**

## Say You Saw It In Popular Science



Brand New!

### OXFORDS

Made on genuine Navy and Army lasts. Black or brown calfskin. All sizes.

**\$6.99**

## SAVE ON WAR SURPLUS!

ARMY  
OR  
NAVY  
TYPE



### DUAL TUBE NAVY LIFE RAFT

Every one tested perfect. Attach to rafts, canoes, to make them tip-proof; or use as life preserver. A child can easily inflate it. . . . . 77c

Send check, Money Order or C. O. D.'s to:

**WORLD SURPLUS STORES**  
WAR Dept. PS-7, 841 S. Blue Island CHICAGO 7, ILL.

**WRITE FOR FREE CATALOG ON OTHER BARGAINS**

Add 25c for postage and handling. Illinois Residents add 2% tax.

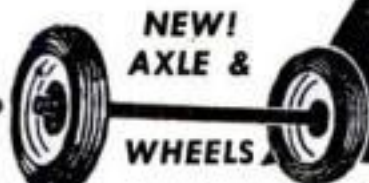


## How to Make Liquid Marble

### And BIG PROFITS In Your Own Business

Amazing Liquid Synthetic Marble can be made at home without machinery. Needs no heat or pressure. Can be poured into molds for casting expensive novelties. Liquid Synthetic Marble can be made in any color. It is even more beautiful than genuine marble because of its highly glazed finish. Costs far less. **FLEXIBLE MOLDS:** Make your own Flexible Molds. Cast novelties, statuary, desk sets, book-ends, etc. out of Liquid Marble, plaster and many other molding compositions. A large sized mold costs but a few cents. Hundreds of casts can be taken from a single mold. **UNLIMITED MARKET:** You will find steady year-round demand in your own community. No selling problem. We supply names of buyers for your finished products. Let **BING PRODUCTS** show you how to start with a small investment and build a permanent, independent, profitable business! Write now for **FREE CATALOG!**

**BING PRODUCTS:** Dept. PS-7A 88 BROAD STREET BOSTON 10, MASS.



**NEW!  
AXLE &  
WHEELS**

### BUILD YOUR OWN TRAILER

**\$26.35**

Minus  
Tires and Tubes  
10% with Order  
Bal. C.O.D.

Ideal for building stock and boat trailers, spray carriers, feed, fence, post, horse or general utility trailer, and for mounting under elevators.

Timken bearings, 59" tread, 16" demountable wheels, solid steel 1 1/2" square axle. **NEW**—we manufacture these—**NOT SURPLUS ITEM!** Stub assemblies also available. Order from ad.

**DEALERS!** Write for Discounts

**STANDARD EQUIPMENT CO.,** Dept. 14, Cedar Rapids, Iowa

You can **NOW** use your

**Electric Razor**

### WITHOUT ELECTRICITY!

Now even miles away from the nearest electric plug, you can use your electric razor. Simply plug it into "PLUG-IN," a compact powerpack, weighing only 24 ounces. It gives up to 100 shaves. Mailed prepaid on receipt of..... **\$2.95**

**BERNARD S. GREIFF CO.**  
420 Market St., San Francisco, Cal.



**WRITE NOW FOR FREE CATALOG SHEETS**



**FOSTER MFG. CO.,** 3 KINSEY AVE., BUFFALO 17, N. Y.

## Say You Saw It In Popular Science

### Only \$16.95 **DUAL PURPOSE SPRAY GUN** Complete

Uses Only 25 lbs. Air Pressure  
**FLOCKS and SANDBLASTS**

**AT HOME:** You can refinish Lamps, Radios, Book Ends, Statues and hundreds of things with lovely colorful flocking. **ETCH GLASS:** Many designs and initials can be sandblasted on shower doors, ash trays, glassware. **AUTO INTERIORS:** Transform ugly dirty auto interiors to "new car beauty" with a **BLASTO DUAL PURPOSE SPRAY GUN**. Merely spray flock similar to Velvet, Plush, Suede and Mohair inside your car. **ANTIQUE WOOD . . . REMOVE PAINT. MAKE EXTRA MONEY** by doing any or all the above for profit. **BLASTO** is highest quality and carries a 3 day money-back guarantee. Operates on small air compressor. Send \$16.95 cash, check or money order for postpaid delivery. Write for free information. Full line of Flocking Supplies.

**BLASTO SPRAY GUN MFG.,** Dept. PS-7, 7007 Haas Ave., Los Angeles 44, Calif.

**NOW**

## THE JIFFY METAL CABINET WITH RUSTPROOF ALUMINUM DRAWERS

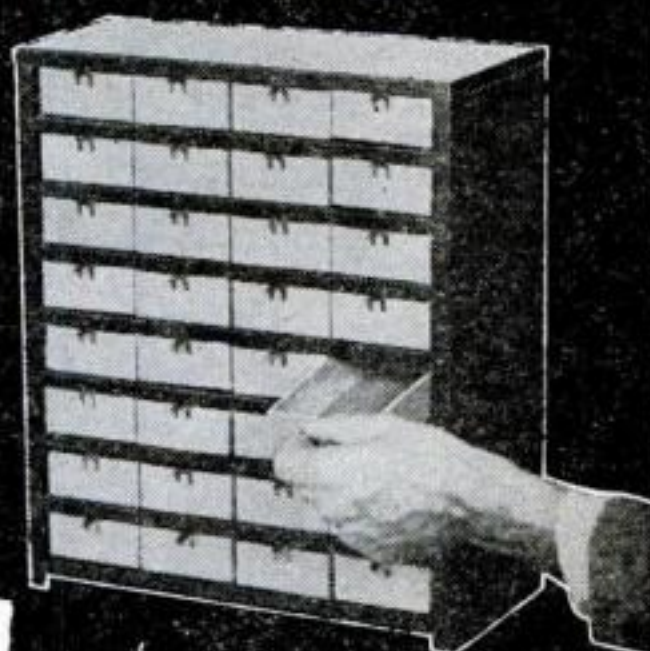
**32  
DRAWER  
UNIT**

**\$8.95**

POSTAGE PAID

**64  
DRAWER  
UNIT**

**\$15.95**



APPROXIMATE  
SIZES  
DRAWER

1 1/4" Deep  
2 3/4" Wide  
6" Long

**32 DRAWER UNIT**

6" Deep  
12 3/4" Wide  
15 1/4" High

**64 DRAWER UNIT**

6" Deep  
25 1/2" Wide  
15 1/4" High

for home or shop,  
the handy way to  
keep small parts,  
washers, nuts, bolts,  
nails, screws, etc.

### AND STILL AVAILABLE

**32  
DRAWER  
UNIT**

**\$5.95**

POSTAGE PAID

**64  
DRAWER  
UNIT**

**\$9.95**

Solid one-piece aluminum drawers for greater strength and long life—and still at low cost. So handy to keep office, shop, work bench, household and hobbyist needs at your fingertips. Spot welded steel cabinet, enamel finish, and metal flange drawer guides.

32-Drawer Unit — \$8.95. 64-Drawer Unit — \$15.95. Postage Paid. Send check or money order. No C. O. D.'s, please. Add 3% sales tax for Ohio orders.

## THE JIFFY METAL CABINET WITH LAMINATED FIBREBOARD DRAWERS

Same steel cabinet as above with covered fibreboard drawers. Suitable for most home needs. Thousands in use. 32-Drawer unit — \$5.95. 64-Drawer unit — \$9.95. Postage Paid. Check or money order. No C.O.D.'s. Add 3% sales tax for Ohio orders.

**KAYTEE PRODUCTS**  
DEPT S • BOX 588 • CANTON, OHIO



# NEW! THIS GIANT WORKSHOP BOOK THAT DOUBLES YOUR SKILL!

## Let Expert Craftsmen Show You How to **GET RESULTS** with **YOUR TOOLS!**

HERE ARE 1,001 ways to *double* the use and enjoyment you get out of your home workshop! This amazing new book shows you how to make *your* tools do a *better* job—how to squeeze every last bit of pleasure and money-saving value out of your jigsaw, lathe, circular saw, drill press, carving motor, jointer, bandsaw, sander, shaper, push drill, planer, polishing motor, fret-saw, scrollsaw, router, grinder, and every other hand and power tool in your shop! You'll learn how to build chairs, tables, cabinets and other furniture; make home repairs and improvements; enjoy scores of additional workshop hobbies.



### HOW TO GET THE MOST OUT OF YOUR HOME WORKSHOP *Shows You Craftsmanship Kinks and Short-Cuts That Double the Value of Your Tools!*

This book is a gold mine for both beginner and expert! Every subject is covered in rich detail, from fundamentals of correct hand sawing and planing to advanced hand-tool techniques like marquetry, inlay work, chip-carving, strapwork. There are big chapters on lathes and how to use them, jigsaws, sanders, drill presses, etc. There are dozens of jigs and attachments that you can make yourself, converting a single machine to do the work of many—home-made special attachments that per-

mit you to do "advanced" jobs simply, easily and with 100% accuracy. How TO GET THE MOST OUT OF YOUR HOME WORKSHOP shows you how to make any kind of a wood joint, how to lay out your workshop for maximum efficiency, how to reclaim worn or damaged tools. It shows you what tools you will need for every job, where to store them—even tells how you can begin your workshop with as little as \$25 and a few feet of space . . . and how to make it grow right along with your needs and increasing skill!

Covers all hand and power tools

### MAIL FREE-TRIAL COUPON NOW!

**POPULAR SCIENCE, Dept. 78A**  
**353 Fourth Avenue, New York 10, N. Y.**

Send me **How to Get the Most out of Your Home Workshop**. I will pay postman price checked plus a few cents postage when book arrives. If not 100% satisfied I may return book within 7 days for full refund.

- ☐ DeLuxe Edition, Buckram bound, stamped in aluminum. \$2.73.  
☐ Regular Edition, Cloth bound. \$1.98.

Name.....

Address.....

City.....Zone....State.....

☐ Check here if you send your remittance now, and we will pay postage. Same return and refund privilege.

### YOURS FOR 7-DAY FREE TRIAL!

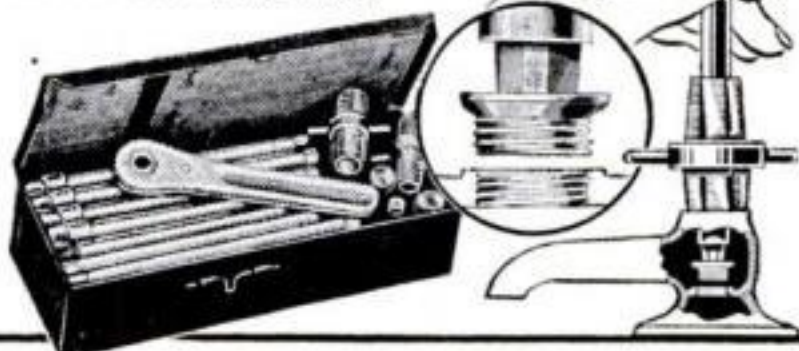
When you see your copy you'll vow it should sell for many times its amazing bargain price of **ONLY \$1.98!** Order it today. Pay postman **ONLY \$1.98** plus postage when it arrives. (Or, if you wish the special DeLuxe Edition, bound in sturdy Lifetime Buckram, pay postman only \$2.73 and postage. This unusually handsome volume has stained page edges and a cover design die-stamped in glittering aluminum—a real book treasure for you!) Use it in your own shop for a whole week! Then, if you haven't *proved* that it can **DOUBLE** the pleasure and value you get from Your Home Workshop, return it for refund of every penny. Send for your **FREE-trial** copy **NOW!**



## STOPS LEAKS PERMANENTLY

Cut your fixture replacement, water and fuel bills with Economy Renewable Seats. Make economical, permanent repairs quickly and easily with the Junior Kit (illus.). Repair bathroom, kitchen and laundry fixtures. Everything you need included in steel box. This is a natural for the "Fixit" shops—get extra income from making permanent repairs on your customers' faucets.

Senior Master Kit also available—repairs faucets and valves up to 1" pipe. At better Jobbers and Hardware Stores . . . or Write Direct.



### ECONOMY VALVE SEAT CO.

3122 N. California Avenue, Chicago 18, Ill.

## HOBBYISTS-MODEL MAKERS

### PRECISION SCREW DRIVER \$1.39

and 5 Blades. POSTPAID  
Tempered alloy steel blades, knurled steel barrel, aluminum swivel top, solid locking chuck. The Screw Driver and five assorted blades in size .100, .080, .070, .055, and .040 are mounted for quick and easy selection in a machined aluminum base, covered with a clear plastic cap. Not a gadget but a handy indispensable tool for every work shop. SEND FOR YOUR SET TODAY.

#### THE TOOL CHEST

P. O. Box 3327, Barnum Station, Bridgeport, Conn.

## REAL DIESEL ENGINE

For Model Planes, Boats and Race Cars. Now you can own and run a real miniature Diesel engine that operates by the heat of compression. No coil, condenser, wires, or annoying ignition failures. Simply flip the prop or fly-wheel to start. It's the new DEEZIL—a .125 cu. in. displacement, 5 oz. engine that runs at 8000 RPM. Order today; only \$12.95 p.p., less tank. Every engine fully tested and guaranteed. DEEZIL MIX FUEL \$1.00; PROP 50c. Send For Valuable Free Price List!

#### GOTHAM HOBBY CORP.

107 East 126th Street New York 35, N.Y. Dep't S

## MILL IT ON YOUR LATHE

### PALMGREN MILLING ATTACHMENT

Mill, slot, grind, groove, square shafts, recess on lathe. Shops, schools, homes need this fixture. Fits Craftsman, Atlas, So. Bend, Logan, Sheldon, Perkins and others. Accurately graduated for rotary and vertical feed. No. 150, 1 1/4" Jaw \$18.75. No. 250, 2 1/4" Jaw, \$24.75. No. 400, 4" Jaw, \$39.75.

ORDER TODAY! Write for Circular No. 10  
CHICAGO TOOL and ENGINEERING CO.  
8396 South Chicago Avenue Chicago 17, Illinois

Made to U.S. Army Specifications!

## 16-JEWEL ELGIN \$19.95



Sturdy 16-Jewel ELGIN men's wrist watches. Water repellent. Sweep second hand. Stainless Steel back. Unbreakable crystal. QUALITY! American made. Fully reconditioned with ONE YEAR GUARANTEE! Made for the U. S. Army Air Corps. They HAD to be good. SEND NO MONEY. Simply pay postman \$19.95 plus 10% tax and postage on delivery. Cash orders sent postpaid. Limited supply. UNITED PRODUCTS CO., 7941 S. Halsted St., Dept. RES-820, Chicago 20, Ill.

## 7 x 50 BINOCULARS

BRAND NEW

\$44

With  
COATED  
Lenses & Prisms  
\$54



Actual  
Photograph  
Ht. 7 in.  
Wt. 36 oz.

These magnificent 7x50 prism binoculars were obtained through the Supreme Commander of the Allied Powers. They have the brilliant luminosity, precise clarity, and wide, undistorted field of view obtainable only with a good large glass. Because 7x50 glasses give the highest performance obtainable they are now the official choice of the Army, Navy and Marine Corps. This is your opportunity to purchase a brand new 7x50 AT 1/3 OF THE USUAL COST. Lifetime construction. Lightweight aluminum body. Ultra-precise optics, sealed against moisture and dust. Unsurpassed by any other binoculars, regardless of price. Sold with a guarantee of complete satisfaction or money refunded. Supply limited so don't delay.

Price Without Case		Price With Richly Finished Case & Straps	
7x50 Uncoated	7x50 Coated	7x50 Uncoated	7x50 Coated
\$44*	\$54*	\$48*	\$58*

\*Plus 20% Federal Tax

IMMEDIATE DELIVERY — WE PAY THE SHIPPING COST

## BROWNSCOPE CO.

Dept. 7P, 24 West 45th St., New York 19, N. Y.

## LOOK! BEST BUY UNDER THE SUN! U. S. ARMY AIR FORCE TYPE SUN GLASSES

Men's and  
Women's sizes



REGULAR  
\$15.00 VALUE

including convenient  
leather case

\$2.49  
postpaid.

Super-Sensationally Priced at only.....

- ★ Ground and polished 4 base lenses.
- ★ Gold plated adjustable frames.
- ★ Pearlloid sweatband and pads.
- ★ Made to highest optical standards.
- ★ U. S. Gov't. approved for absorption of ultra-violet and infra-red rays.

LIFETIME GUARANTEE { At any time during life of these sun glasses, we will fix them for a nominal service charge of 50c.

MAIL  
THIS  
COUPON  
TODAY!

AMERICAN HANDICRAFTERS, Dept. P57  
2905 W. Madison St., Chicago 12, Ill.

Please send me.....men's.....women's SUN GLASSES

☐ Send C.O.D.

☐ Enclosed find check or money order for \$2.49 each, postpaid.

Name.....

Address.....

City & State.....

Write For Free Catalog



## New Advertising Machine



**PRINTS and ILLUSTRATES 1¢ POST CARDS**

Send Coupon

**CARDMASTER CO., 4546 Ravenswood DEPT. 167, CHICAGO 40, ILL.**

Send **FREE** Illustrated Book\* and complete, unique advertising plans and money making ideas for my business.

\* Shows HOW thousands of business men in every line are boosting sales in spite of conditions with 1c messages printed and illustrated in few minutes on gov't post cards—with amazing, new, patented **CARDMASTER**. Your "today's" ideas, read by your prospects next morning. Not a toy, but a sturdy advertising machine built to last years. Sold direct at low price. Guaranteed five years. **SEND NAME TODAY. All FREE!**

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



**GIVE YOUR EYES THIS TREAT**

**GENUINE U. S. ARMY AIR CORPS SUN GLASSES**

**THEY SOLD IN THE PX STORES FOR \$10.00 GUARANTEED BRAND NEW—WITH CASE**

These are **GENUINE** Air Corps glasses—NOT the Air Force TYPE. Made by a famous name optical company to Gov't specifications with finely processed metal frame, plastic sweat bar, adjustable nose pads and easy flexing ear loops. Optically ground 4 base green aviation lenses cut out over 90% of harmful sun rays. Glasses are brand new—case included.

**PRAISED BY GEN. HAP ARNOLD**

These are the glasses that Gen. Hap Arnold was so lavish in his praise about. Use them for all outdoor sports, sunbathing, driving, etc. Money back guarantee. Send check or money order. Two pair \$9.00. One pair, postpaid.....

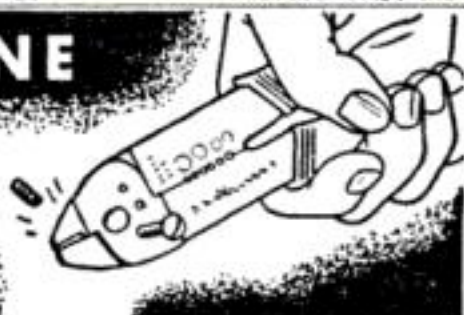
**\$4.95**

**CARLETON HOUSE 3312 Lincoln Ave., Dept. PS 7 CHICAGO 13, ILLINOIS**

**CANVAS COVERS** Waterproof tarpaulins, war surplus (Used), perfect condition. Originally made for tents. Approx. 5'x8'. Two buttoned together make approx. 80 sq. ft. Complete with buttons attached. Suitable for use as canvas dams, hay covers, truck covers, machinery and equipment covers, etc. Packed in bales of 30, priced 30 covers, \$1.50 ea; 15 covers, \$2.00 ea. Less than 15, \$2.50 ea. All FOB, Kansas City.

**AMERICAN SUPPLY CO. 329 W. 5th Dept. P. S. Kansas City, Mo.**

**CUT MACHINE SCREWS** without damaging threads!



Amazing new AMP "SHEARITE" hand tool shears machine screws right off! No burrs, no smashed threads! For #10-32, 8-32, 6-32 and 4-40 screws—brass or steel. Cuts and strips electrical wire too, sizes 22-10. Electricians, machinists, mechanics, hobbyists—everyone needs "SHEARITE"! Order today. Send cash, check or money order. Only \$3.95 complete, postpaid.

**RICHARD RENNER ASSOCIATES, Dept. PS 315 South 15th Street, Philadelphia 2, Pa.**

262 POPULAR SCIENCE

## BRAND NEW SURPLUS BARGAINS

New Precision Bilt

### MICROMETERS

Chrome finished nationally known makes. Gives a lifetime of accurate detailed service. Individually boxed.

1" Central	\$3.50
1" Central, Tubular	3.75
1" Reed	4.00
2" Central	4.95
2" Reed	5.25
4" Central	6.25
5" Reed	7.25
6" Central	7.75



**Work Table LAMP**

Overall dimensions, 24 1/4", wt. 1 lb. Has 3 flexible ball joints, 110 volt. Less bulb and plug. Real surplus bargain. Only \$2.95 Bulbs 38c extra Add 25c handling and mailing

Prices FOB, Kansas City, Mo. No COD's.

Write for our new Catalog

**ATLAS SALVAGE & EQUIPMENT CO. 229 S. W. Blvd. Kansas City, Mo.**

### HIGH PRESSURE HYDRAULIC PUMP FOR HOME, SHOP AND FARM USE



Genuine Vickers constant displacement high pressure pump. Use it for any type of liquid pumping job. Will pump 400 gal. per hour at 3750 R.P.M. Precision piston type design provides 1000 lbs. per square inch pressure. Self priming. Standard thread 3/4 inch intake and discharge ports. With 3/8 inch splined shaft—just add pulley and power and you're ready to go.

**HAS HUNDREDS OF USES**

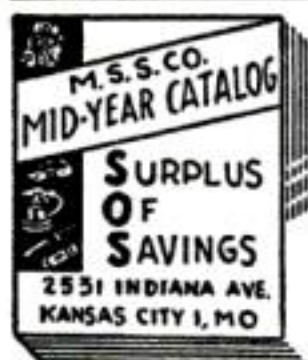
These pumps are brand new. Original acquisition cost approx. \$100.00. Can also be used as hydraulic motor; for rams, opening doors, hydraulic lifts, etc. —also for any liquid transporting job. War surplus, but brand new. Shp. wgt. 7 lbs. Send check or money order. Satisfaction guaranteed. Postpaid in U.S.A. Ea.

**\$9.95**

**SOUTHWEST AERO SUPPLY, Dept. PS7 Drawer 488 South Houston, Texas**

### NEW PATENTED PLATING PROCESS No Vats. Brushes or Electricity needed!

Just rub **INSTANT NICKEL, SILVER or GOLD** on to Iron, Steel, Brass, Silver, Copper, Bronze, etc., and **INSTANTLY** it takes on a heavy, permanent **PLATING** of **NICKEL, SILVER, or GOLD**. (Pat. Jan. 1948, & Pats. Pend. resp.) Makes old, worn, dingy or shabby table ware, faucets, instruments, furniture, appliances, urns, bicycle or machinery parts, almost anything of metal, look like **NEW**. A **PLATING**, not just a polish. Contains **NO POISONOUS CYANIDES OR QUICK SILVER**. Will not crack or peel off. Plate for others at handsome profit. Fascinating hobby. Sensational introd. offer: Complete kit of each: **GOLD, SILVER, or NICKEL**, \$2.50, postpaid. Any two, \$4.75. All three, \$6.75. C.O.D.'s few cents extra. **INSTANT PLATING**, Dept. 7, 1216 Park Row Bldg., New York 7, N. Y.



### NEW BARGAIN CATALOG

Now ready for mailing. Thousands of Govt. and Civilian Surplus items. For the home, industry and farm. Machinery, Motors, Hdw., Elec. Supplies, etc. Write **NOW** to

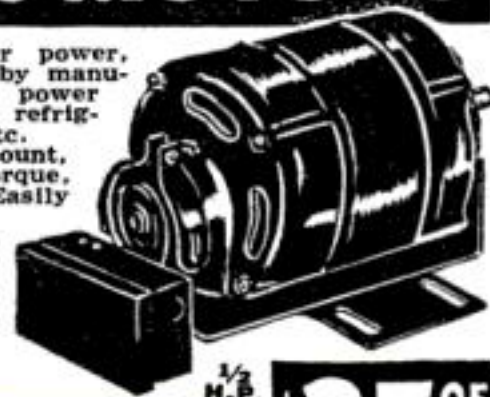
**MIDWEST SURPLUS SALES CO. 2531 Indiana Kansas City 1, Mo.**

**Say You Saw It In Popular Science**

### New Low Prices on ELECTRIC MOTORS

**IMMEDIATE DELIVERY!** Super power, heavy duty. 1-year guarantee by manufacturer on these trouble-free power units. Use for pumps, stokers, refrigeration units, fans, blowers, etc. Capacitor start, resilient mount, single phase, high starting torque. Klaxon overload protected. Easily reversible.

**60 cycle 115-230V-AC**  
25% deposit on C.O.D. Orders.  
Cash orders shipped prepaid.  
1/4 H. P. .... \$16.95  
1/3 H. P. .... \$19.95



Dealers Wanted: Write for quantity prices today.

**AMERICAN DIST. CO., Dept. S-7 P. O. Box 1042 Central Station St. Louis, Mo.**

**\$27.95**



## BUILD and ENJOY YOUR OWN BOAT!



ASSEMBLED IN  
8 HOURS

WITH A  
**Plywood Boat Kit, ONLY \$54.00**

**LIGHTWEIGHT, 12 FEET LONG.** Freight paid  
READY CUT—needs no forms nor special tools to assemble. Kit includes all hardware, paint, etc. (less oars).  
Send for Free Folder

**TAFT MARINE WOODCRAFT**

Dept. N, 636 39th Ave. N.E., Minneapolis 18, Minn.

## CARBURETOR TOO RICH MAKES MOTORIST TOO POOR



Car owners who are wasting money and not getting proper gas mileage due to over-rich mixtures will be pleased to learn how to save gasoline by VACU-MATING over-rich mixtures. VACU-MATIC fits all cars, trucks and tractors. It is automatic and operates on the supercharge principle. Easily installed in a few minutes.

**SALESMEN WANTED!** Big Profits!

Send name, address on penny postcard for free particulars and how to get yours for introducing.

VACU-MATIC CO., 7617-1373 W. State St., WAUWATOSAS, WIS.

## BUSINESS OPPORTUNITIES



**BUY COCA-COLA  
CUP VENDING MACHINES**

at a price of

**\$1195.00 F.O.B., NEW YORK**

Own and operate these machines in any Theatre, Industrial Plant, or any place where people gather, and watch your profits grow!

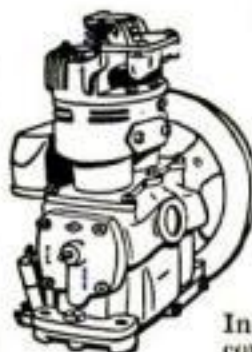
Kindly Send 1/3 Deposit With Order, Balance C.O.D.

**CAMEO VENDING Dept. D**

432 West 42nd St.

New York, N. Y.

## REAL SURPLUS VALUES AIR COMPRESSORS



Model 2-U-S-4-V-A Bendix-Westinghouse 4 cu. ft.

Govt. Surplus, 2 cylinder Bus and Truck Type. Ball bearing crank shaft. Pressure feed oil system. Positively one of the finest and most accurately built air compressors on the market.

Original Cost Over \$140.00

In good operating condition with 30 day written guarantee

**\$34.50**

Special Low "as is" price

**\$29.50**

Accessories available for compressors, air regulators, safety valves, air gauges, control governor, misc. fittings, hose, paint guns. Write for Prices and Catalogue.

## BRIGGS-STRATTON ENGINES

**1 1/2 Hp Model N—Govt. Surplus**

Special Low  
"as is" price  
Only.....

**\$34.50**

In good operating condition with 30 day written guarantee..... **\$44.50**

Engines will develop almost 2 Hp at 3600 RPM. Hurry, don't wait, buy now while limited supply lasts. Suitable for lawn mowers, garden tractors, motor bicycles and scooters, midget cars, etc. Will power many kinds of machinery.



## EMERGENCY SUPPLY TANK

Fill at any gas station. 150 lbs. airs 5 flat tires. Inflates rubber boats. Use for touch-up spray jobs, tire service truck, air horns, dust out motors, machinery, etc.

Shatterproof 12"x24" stainless steel tank with carry handle, check valve, two feet hose and tire filling chuck. **\$7.95**

Tank only 12"x24", tapped each end 1/4 pipe thread. 500 lb. pressure. Build your own. Ideal for paint spray, air receivers, net floats, buoys, etc. Each..... **\$4.75**

Small size tank, 6"x24". Only..... **\$2.98**

Prices FOB, K. C. Write for new catalog.

**MIDWEST SURPLUS SALES CO.** 2531 Indiana Kansas City 1, Mo.

Say You Saw  
It In Popular Science

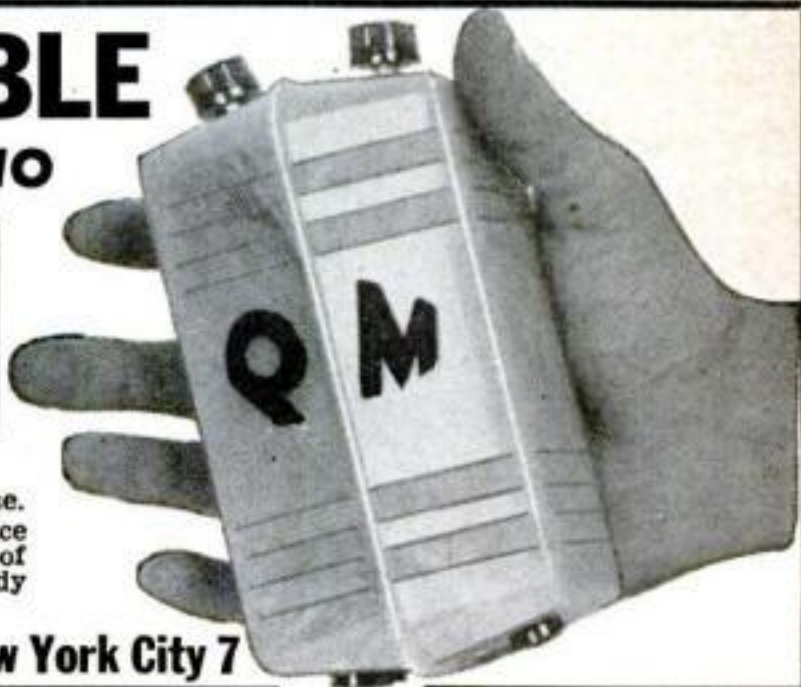
## POCKET-MITE PORTABLE

**POWERFUL • EXCITING • MIDGET RADIO**

A Beautiful Plastic Cased  
**POCKET RADIO**

Tiny enough to easily slip into pants or jacket pocket, yet features miniature hearing-aid tubes, self-contained loop-antenna and powered by newly-developed, long-life, midget hearing-aid battery to bring in stations clear and strong. No outside ground or antenna is used for reception within 50 mile radius. Auxiliary plug-in antenna provided for over 2,000 mile distance use. This beautiful set is custom-built and not obtainable elsewhere. Low price possible only by direct shipment from laboratory to you. Complete set of finished midget parts including tubes and beginners picture diagram. Ready to wire as shown only \$6.99 postpaid (Foreign \$8.00 U. S. Cash).

**\$6.99**



**ELECTRONIC RESEARCH LABS. 1216 Park Row Bldg. New York City 7**



# WAR SURPLUS AND OTHER BARGAINS

## BLOWER COOLER or HEATER:



For trailers, autos, offices, darkrooms, homes. DUMORE Motor, 1/6 cont. HP, Amperage 7.5, RPM 6400, 24 Volts. May also be used as dryer. Simple installation, radiator type, copper coils. Transformer advertised in this ad will operate this unit from house current. Weight 13 lbs. New, \$15.00

**SHIP'S BELL:** U. S. Navy Surplus. Solid Brass with smooth polished finish. 5" Diameter. Great for Patios, Doorways, in Dens, Ranches, etc. Matching solid brass wall bracket included. Weight 3 1/4 lbs. All New. \$5.95 Each.



## MICROMETER

Chrome plated, precision engineered and carefully tooled to give long life ...

all new. 0-1" capacity, \$2.25.  
1-2" capacity, \$3.50 Each.

**TRANSFORMER:** Jefferson Electric step up or step down transformer. Input, primary 110-117 Volts A.C. Output, from 5 Volts to 650 Volts. Suitable for use with war surplus gadgets, heater relays, radio test filaments, electric trains, house chimes, etc. Weight 10 lbs. New. \$7.95 Each.



**CONDUIT WRENCH:** Mfd. by JOAR. Jaws pass over conduit, pipe or tubing, slips down to snugly encircle fittings. Slight pressure tightens or loosens fittings. Will not mar or kink material. Set of 8. All new wrenches, Nos. 4-6-7-8-10-14-22-28, (Reg. cost \$50.00), \$10.00 per set.



Send check, money order or cash. 25% Deposit required on C.O.D. orders. All prices F.O.B. Culver City, Calif.

**AIRBORNE SALES CO., INC.** DEPT. PSM 7-B  
CULVER CITY, CALIF.

**IT'S NEW! IT'S TERRIFIC!**

*Ancient easy-carving*  
**STONE**

Beautiful in grain and color. Permanent stone. Cuts with pocket-knife. Rivals jade. File, sandpaper, steel wool plus oil gives excellent finish! Turns easily on lathe...

**Endorsed by Professionals!**  
KITS \$6.00-2.60 P.M. East of Mississippi. INSTRUCTIONS  
No C.O.D. OTHER SIZE STONES AVAILABLE - PRICES ON REQUEST  
FAR EASTERN SCULPSTONE CO. 1 E. 42 St. New York 17



## WAR SURPLUS LUBE PUMP \$3.95 POSTPAID

### NEW PRECISION GEAR IMPELLER PUMP

An aviation unit of finest bronze and steel construction, 3 1/2"x8 1/2" size. Std 1/2" shaft. Mechanics say it is "out of this world!"

- Useful for pumping high vacuum, air pressure, liquids, coolant for lathes, operating hydraulic units, etc.
- Actually two pumps in one housing. Operates in parallel for large capacity or in tandem for high pressure.
- Full instructions and specifications furnished. Sent postpaid \$3.95. Send check, money order or currency, or will ship P.P. C.O.D.



Original Cost \$24.25

LECO ENGINEERING CO. Box 908-LP2 Lincoln, Nebr.

## SAVE \$64.00 AND UP! Pneumatic Air Tools

Ideal fender and bumping hammers, and for riveting brake lining, concrete breaking and many other uses. Like new. At these unheard of low prices it pays to order a good supply.



### RIVETER & CHIPPING HAMMER

Ingersoll-Rand AVC-11 with air control, push button throttle. Takes up to 5/32 rivet. Like new. Weight 5 pounds. List Price \$73.00—**\$7.95**  
Special Price.....



### RIVETER & CHIPPING HAMMER

Chicago pneumatic CP4 with air control, push button throttle. Takes up to 3/16 rivet. Weight 6 lbs. List Price \$73.00—**\$8.95**  
Special Price.....



### CHICAGO PNEUMATIC RIVETER & CHIPPING HAMMER

CP9X offset handle, with air control. Takes up to 1/4" rivet, weight 8 lbs. List Price \$79.00. Special Price.....**\$10.95**



### THOR PNEUMATIC ALLIGATOR Squeezer and Compression Riveter

Model PRS-10, Alligator jaws, or PRS-10, "C" Type Yoke. Weight 5 lbs. List Price \$93.00—Special Price.....**\$12.95**

PRICES ARE F.O.B. CHICAGO. Immediate delivery. **SOLD ON MONEY BACK GUARANTEE.** Send check or money order today.  
**C & M EQUIPMENT COMPANY** 1831 S. State St., Dept. B-7, Chicago 16, Ill.

## 2,000 FOREIGN STAMPS \$1

Biggest bargains in America! 2,000 Foreign stamps \$1.00. 5,000 \$2.00. 2,000 United States stamps \$1.00. 5,000 \$2.00. Order today.  
**STANDARD COMPANY, Dept. A-4120**  
930 F Street, N.W. Washington 4, D. C.



## SAVE on High Quality Dress Trousers GABARDINE for Summer Wear

Huge direct-to-you volume enables us to give exceptional value! Fully guaranteed. Genuine virgin wool and fine-spun rayon. Cool, comfortable. Twill weave resists wrinkles, holds crease, gives amazing wear. Expert fashion tailored for perfect fit. Zipper front. Roomy pockets. Blue, Tan, Sand, Lt. or Dk. Blue, Blue-Gray.

WAIST SIZES: 28-38 pleated or 28-44 plain.  
**SEND NO MONEY** Send name, waist size, color. Pay postman only \$6.95 plus small postage. Or, send money and save postage.  
**LINCOLN TAILORS, Dept. PS-7, Lincoln, Nebr.**

\$12.00  
VALUE

**\$6.95**  
PR.



## Wonders Through The MICROSCOPE

A new book which tells you all about MICROSCOPY. Turn an inexpensive microscope on hundreds of specimens within a stone's throw of your front door and you step off into a new world of wonders. Complete manual for amateurs. How to use equipment, secure and preserve specimens, take photomicrographs, etc. Numerous illustrations. Full cloth bound, \$1.49.

**POPULAR SCIENCE MONTHLY, Dept. 78, 353 4th Ave., New York 10, N. Y.**



## Powell SETS THE PACE

DEALER INQUIRIES  
INVITED

- 7 H.P. Motorcycle-type Engine
- Faster pick-up than a car
- Automatic clutch
- Smooth, simplified control

- Solid steel frame
- Highway cruising speed of 45 miles per hour
- Chrome-plated fenders,

- handlebars, and sport muffler—looks like a custom job
- Costs no more than ordinary scooters

Write for **FREE FOLDER** and address of nearest dealer

**Powell MANUFACTURING COMPANY**

DEPT. PS-7  
COMPTON, CALIF.



**Now A DYNAMIC**  
Industrial Transformer Type  
Super **WELDER** **ONLY**

**FOR AUTO—HOME APPLIANCE & FARM IMPLEMENT REPAIRS! \$28.50**  
**WORKS ON IRON, STEEL & other metals . . . does work you'd expect from a larger, costlier machine; portable, easily carried; OPERATES FROM ANY properly wired 110 VOLT LINE. Also available for 220 volt operation at slight additional cost; has 8 metallic & carbon arc welding heat stages. EASY TO OPERATE TRANSFORMER TYPE WELDER—If inexperienced you can learn to do professional work by following the SIMPLIFIED WELDING & OPERATING INSTRUCTIONS FURNISHED—comes complete ready to operate with helmet, rods, cable, instructions. SAVE TIME AND MONEY—Do your own welding—Just a few repair jobs will pay for this machine. A practical and profitable machine tool for any workshop. Make money doing repair work for others. Write today for full particulars and 10 DAY FREE TRIAL OFFER.**  
**DYNAMIC WELDER CO., 15 E. 23rd St., AK, Chicago 16, Ill.**



**6 NEW GADGETS FOR \$1.00**  
Preview the newest inventions of America's "gadgeteers." One dollar brings you SIX new, patented, exclusive gadgets—one a month for six months! Get them before public sale anywhere. Send \$1.00 today to  
**GADGET OF THE MONTH CLUB, INC.**  
P. O. Box 2000 Los Angeles 54, Calif.

**REDUCE DRIVING GLARE**  
Both NITE and DAY with a ROYAL-LITE Glare Shield. Senior size \$4.95, Junior size \$1.95. Order direct, or write for additional information.  
**ROYAL-LITE SALES CORP., Room 211, Dept. S.J.**  
1007 South Grand Ave. Los Angeles 15, Calif.

**PAINT \$1.69 GAL.**  
• Surplus bargain! Genuine Armstrong lusterless OD enamel for both inside and outside use—for farm buildings, porches, homes, industrial equipment, etc. For metal or wood. Add pigment if desired to change color. The bargain of a lifetime while quantity lasts. F.O.B. Oklahoma City. Send check or money order.  
1 Gal. \$1.69; 5 Gal. \$1.50 Gal.; 55 Gal. Steel Drum \$1.12 Gal.  
**FEDERAL IDENTIFICATION CO.**  
Dept. P57, 1910 Classen Blvd.  
OKLAHOMA CITY, OKLAHOMA



**Built for WEAR-COMFORT**  
**Military style COMBAT BOOTS \$6.55**  
**FIELD SHOES \$4.99**

**SIZES 6 TO 12**

**NAVY style—rugged and comfortable—reversed uppers. Full oak leather innersole with hard wearing composition outer sole. Sizes 6 to 12. D to EE. Add 22c postage please.**

**For work, outdoor sports, etc. About 9" high—sturdy reversed uppers, full oak leather innersole with extra composition outer sole. Size 6 to 12. D to EE. Add 27c postage please.**



**MAIL ORDERS**  
Please send remittance with order. Include postage. Guaranteed satisfaction or your money back.

**Officer type OXFORDS \$6.88**

**ORDER TODAY!**

**Exceptional values—black or brown. Best quality uppers, solid oak leather soles. Worth considerable more than our low price. Size 6 to 12. D & E. Add 20c postage please.**

• BROWN  
• BLACK



**SIoux FALLS SURPLUS STORE**  
**SIoux FALLS, S.D.**

**SEND FOR FREE War Surplus CIRCULAR**

**FREE Sample Of New PLASTIC Shows How To Make Leather and Leatherette LIKE NEW!**

**MAGICALLY CHANGES CLOTH TO IMITATION LEATHER**  
**SAVE MONEY - TIME AND EFFORT** by renewing Luggage—Leather Covered Furniture—Golf Bags—Auto Seat Covers—Restaurant Furniture, Booths or any Leather or Leatherette item with new plastic discovery called Leather-New. Coat cloth or cloth covered items such as Gilder Cushions, Tarpaulins, Porch Furniture, Etc. and make them look and wear like they were leather. Spreads easily with brush or spray gun—leaves NO BRUSH MARKS. Simple Acids, Caustics and Alcohols do not stain this finish—It is sun and mildew proof. Stays Fresh and Clean as long as real leather. Comes in all standard colors. Just mail coupon for Free sample of Leather-New coated material which shows effects.  
**LEATHER-NEW PRODUCTS, 4723 Troost, Dept. S-3, Kansas City, Mo.**

**OWN A PROFITABLE LIFETIME BUSINESS**  
Cash in on big profits to be made in this new business—Profits up to \$700.00 monthly possible, renewing booths and furniture for bars, restaurants, grills, movie houses, etc. Mail name and address on 1c postcard—I'll show you how. **Jack Edwards, Sales Mgr.**

**JUST MAIL COUPON**  
**No Obligation**  
Leather-New Products,  
4723 Troost, Dept. S-3, Kansas City, Mo.  
Name.....  
Address.....  
City..... State.....  
Fill Out—Mail Today

**JOHNSON MOTORS, INC.**

**NATIONAL DISTRIBUTOR**

**TESTER'S ROAD REPORT**

MAXIMUM SPEEDS IN			
GEAR	RATIO	M.P.H.	R.P.M.
HIGH	4.48:1	65	4875
SECOND	7.25:1	50	5800
LOW	11.75:1	30	6100

SPEED AT END OF 1/4-MILE STANDING START: 62 M.P.H. FUEL CONSUMPTION: 70 M.P.G.

**Mustang**  
**MOTORCYCLES**



**DEALERSHIPS AVAILABLE** for this new, low cost **MUSTANG** motorcycle . . . for economy of operation, maximum safety and breath-taking performance, it's **MUSTANG!**

Write: **JOHNSON MOTORS, INC., 267-A West Colorado St., Pasadena 1, Calif.**



## Talk AS FAR AS 17 MILES WITH ARMY FIELD *Telephones*



Easy to install for quick, low-cost dependable 2-way communication, indoors or out. Compact... rugged... portable. Originally cost government \$39.90 each. Hundreds of uses around home, shop, farm, industry. Performance equals present-day commercial telephones.



You will be amazed at simplicity of operation. Just hook up terminals of two or more phones to any two-strand wire and you are ready to talk! Up to six phones can be used on single line without a switchboard. Powered by standard flashlight batteries. No maintenance required. Each phone complete with self-contained hand-operated ringer. Every phone checked for perfect operation and fully guaranteed.

### Now as Low as \$7.45 each

USED—good, serviceable condition ..... \$ 7.45 ea.  
USED—excellent condition ..... 8.95 ea.  
RECONDITIONED—(by U.S. Signal Corps) ..... 10.75 ea.  
NEW—unused but soiled ..... 10.75 ea.

BRAND NEW PHONES—canvas case ..... 15.00 ea.  
BRAND NEW PHONES—mfg. by Western Electric, Stromberg Carlson and Kellogg, with canvas case ..... 16.75 ea.

NEW WESTERN ELECTRIC HANDSETS .... Pstpd. 4.75 ea.

WIRE — UNUSED W-110-B two-strand ARMY FIELD WIRE—500 ft. .... \$3.50, 1000 ft. .... 6.50  
(One-mile reels also available.)

### BRAND NEW SWITCHBOARDS

For systems of six to 24 phones, use  
ARMY FIELD TELEPHONE SWITCHBOARDS:

NEW—BD-71, 6 drops ..... \$32.50 ea.  
NEW—BD-72, 12 drops ..... 65.00 ea.  
NEW—BD-72, with outer cases soiled.... 45.50 ea.

Write for New FREE Folder—Just Out

All prices FOB Sacramento. No COD. California residents add 2½ % for sales tax.

SEND CHECK OR  
MONEY ORDER

## LORIS SALES

P. O. Box 1896-A

Sacramento, California

## TERRIFIC VALUE— PORTABLE ELECTRIC DRILL

(Sold at less than established factory price so we cannot mention brand name)

Only \$19.95 equipped with 1½" Jacobs Geared Chuck and Key. Not an intermittent duty drill, but a full size rugged tool. Most convenient type switch, natural grip handle, and balance like a six shooter. Precision cut gears—turbine type cooling blower—extra long brushes. No stalling under heaviest pressure because of powerful 110 Volt AC-DC motor and multiple ball bearing thrust. Other bearings self-aligning lifetime-lubricated Oilite type. Made for toughest year-in and year-out service in plant or on construction jobs.

Amazing perpetual factory guarantee assures you of a lifetime of trouble-free use. 25% deposit on C.O.D.'s. Full refund (you pay transportation) if not pleased with drill after trial.



### BUFFALO RADIO SUPPLY

219 Genesee St.  
Buffalo 3, N. Y.

Say You Saw  
It In Popular Science



## DO YOU SUFFER

from  
**RHEUMATISM?  
ARTHRITIS? NEURITIS?  
SCIATICA?**

Send for **FREE BOOK**

describing the proven, specialized treatment that has been amazingly successful in combatting rheumatism, arthritis and similar painful disorders. This illustrated book "RHEUMATISM" fully explains causes and effects . . . tells you WHY drugs and medicines afford but temporary relief. Delay may be dangerous.

### LEARN ABOUT SPECIALIZED TREATMENT

Send for FREE Book today—a postcard will do. No obligation. Write today.

**BALL CLINIC** Dept. 36, Excelsior Springs, Mo.

## BRAND NEW Black & Decker A.C. D.C. Drill

WITH  
JACOBS  
CHUCK



WILL  
POLISH OR SAND  
AUTOS-FURNITURE-BOATS-ETC.

WILL DRILL STEEL-IRON-  
WOOD OR PLASTICS.

ADD \$3.00 FOR 13 HIGH  
SPEED STEEL DRILLS.

Tool Chest can be used  
STATIONARY POWER TOOL

WITH THESE  
FLEXIBLE  
POLISHING  
& SANDING  
ATTACHMENTS  
IN THIS STURDY  
CONVERTIBLE  
TOOL CHEST

ALL FOR

**22.95**  
We pay all  
charges with  
check or money orders.

## YOUR DRILL WILL **POLISH & SAND**

WITH THESE ATTACHMENTS

Ready to slip into chuck of any drill



This Flexible Lamb's  
Wool Polishing At-  
tachment, 6" Polish-  
ing Surface

+



Polish or Sand Your  
Furniture—Silver-  
ware, Wood Work,  
Floors, etc., with this  
Flexible

**POLISHER**

1 Extra Lamb's Wool  
Bonnet. A Gener-  
ous Supply of As-  
sorted Sandpaper

**\$5.00**

FOR  
EVERYTHING  
COMPLETE

**SANDER**

C.O.D. ORDER  
ACCEPTED  
ON \$1  
DEPOSIT

Sand evenly with a new "FAST METHOD" chang-  
ing sandpaper; No screw or Hole in Sandpaper.  
Complete with Instructions How to apply Sand-  
paper & Clean Polishing Bonnets.

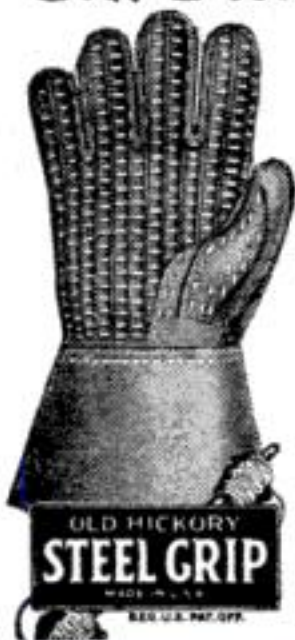
**JONRICH CO.**

E. Office 112 W. 42nd St.  
N. Y. 18, Dept. PS



## SAFE HANDS

## WORK FASTER



### with Steel-Grip Gloves

The best opportunity for lower costs lies in speeding production. Keep materials moving with Steel-Grip Reinforced Gloves. They handle rough, heavy, jagged materials at breathless pace. Chrome tanned cowhide. Steel ribbon reinforced palm and fingers. Steel thread sewed. Protect against cuts, bruises. Or what's your need? Over 4300 proved Steel-Grip Safeguards may give immediate answer. Used by big industrials since 1910. Write for catalog or state your need today.

**INDUSTRIAL GLOVES CO.**  
1422 Garfield Blvd., Danville, Ill.  
In Canada: Safety Supply Co., Toronto

## MEN'S FULLY GUARANTEED NEW 15-JEWEL WRIST WATCH 13.95 PLUS TAX

ORIGINALLY sold up to '55

Sacrificed because they're post-war surplus  
**LOOK AT THESE FEATURES:**

Luminous dial . . . sweep second hand  
waterproof . . . shockproof . . .  
anti-magnetic . . . imported Swiss  
precision movement and case.  
You get them now for a small fraction  
of original prices. Don't delay! Order  
now . . . while they last. Send only \$1  
down payment with order. Pay balance  
to postman on arrival, plus postage.  
Or we pay postage if you enclose  
\$13.95 plus \$1.39 Fed. Tax.

Receive Reg. \$2 expansion band FREE  
with prepaid order. Money back in 5  
days if not delighted. Order now.  
**MARYLAND DISTRIBUTORS, Dept. 105**  
501 E. Baltimore St., Baltimore 2, Md.



## STOP COLLISION FIRES!

### 5 MINUTES TO INSTALL

"Anti-Fire Bug" guaranteed to cut  
ignition at instant of crash. Pro-  
tect your family, prevent crema-  
tion alive. Cuts off 8000 or more  
volts. Bolts to engine. Precision  
built. Unaffected by ordinary jars.  
Traffic commission recommends.  
Send name, address; check or cash.



Postpaid  
**CALIF. AUTOMATIC COLLISION SWITCH CO.** 4014 Shasta St.  
San Diego, Calif. **\$1**

## MAKE EXTRA MONEY IN YOUR SPARE TIME

MAIL  
THIS  
COUPON  
NOW!

**BIG PROFITS** are waiting for you  
right in your own community . . .  
and those profits can be yours when  
you represent **POPULAR SCIENCE**  
**MONTHLY & OUTDOOR LIFE**. Get  
on the money-making bandwagon  
with other agents  
who are making  
amazing profits.  
Start taking sub-  
scriptions to Popu-  
lar Science and  
Outdoor Life in  
your community  
**NOW!** Send coupon  
**TODAY!** . . . and we  
will rush free  
streamlined kit and  
complete instruc-  
tions.



**Popular Science Publishing Co., Inc., Dept. 78**  
353 Fourth Ave., New York 10, N. Y.

Please rush me **FREE KIT** and complete instruc-  
tions for making extra money in my spare time.

NAME.....  
STREET & NO.....  
TOWN & STATE.....

## SURPLUS VALUES WHILE THEY LAST

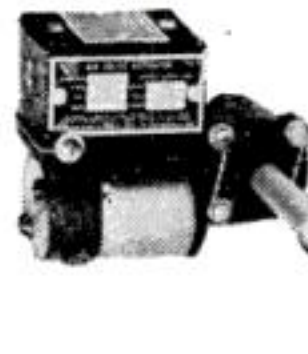


**HYDRAULIC PUMP**, 7 cyl-  
inder, Vickers pat. 1000 PSI at  
6 1/4 GPM, Gas, Oil or Water.  
Ideal for hydraulic presses,  
circulating pump, cool-  
ant, etc. Also operates  
as hydraulic motor up  
to 3 HP.

**\$9.95**

**HIGH-PRESSURE  
CYLINDER**, ICC li-  
censed, 1800 lbs. press,  
11 1/4" long, 2" dia. with  
valve. Usable with oxy-  
gen, CO<sub>2</sub>, hydrogen,  
etc.

**\$1.95**



**MOTOR ACTUATOR  
UNIT**, push or pull, 2 3/4" up to  
50 lbs. press, operates 10-30 volt  
AC or DC, automatic shut  
off, reversible with S.P.D.T.  
switch. Fine for operating  
valves, shutters, windows,  
switches, etc., at any dis-  
tance.

**\$4.95**

**DENISON VALVE**, remote oper-  
ated, off-on valve for gas, oil, wa-  
ter, etc. 26 ft copper tubing between  
operating head and valve head, can  
be converted to remote mechanical  
actuator.

**\$4.95**



**HI-PRESSURE TANK**,  
stainless steel, complete with  
low pressure regulator and  
500 lb gauge. 2 qt capacity,  
fine for oxygen, butane, pro-  
pane, gasoline. Rated 400 lbs  
working pressure.

**\$1.95**



**MINIATURE MOTORS**, 8000 RPM, 24 volt  
AC or DC, 1 1/2" dia, 3" long, ball bear-  
ings ..... **\$2.95**

**MICARTA PULLEY WHEELS**, 2 7/32" diam-  
eter, ball bearing hub, grooved edge for  
1/8" cable ..... **\$ .25**

**FILTER**, Cuno self-turning oil filters  
without cases. Terrific bargain ..... **\$ .99**

**DC MOTORS**, 1 1/2 HP, 24 volt with  
magnetic clutch ..... **\$9.95**

**HYDRAULIC PUMP**, hand operated,  
Pesco, high pressure ..... **\$4.95**

**ALL MDSE. NEW, CARTONED**  
**ORDERS SENT EXPRESS COLLECT**

Send 10c in stamps or coin for illustrated price list.

**D & M SALES CO.**

**P. O. Box 2497 Tulsa, Oklahoma**



# This kind of magic is easy!



NOTHING in your hands! Nothing up your sleeves! But look...

...out of your *present income* grows a wonderful future. There's a home in the country, college for your children, travel and fun for the whole family, even a comfortable retirement income for yourself.

Here's how the magic works. All you do is sign up for the Payroll Plan. Then regularly, automatically, part of everything you earn is used to purchase U. S. Savings Bonds.

And magically, week after week, these *automatic savings* pile up the money you'll need to pay for the future you want! **Don't forget** that you're making

money, too... every \$75 Bond you buy today will be worth \$100 in just 10 years. And these Bonds play a big part in helping keep our country financially sound and strong, too.

If you're not on a payroll, and have a checking account, you can still enjoy the magic of automatic saving with the Bond-A-Month Plan. Ask about it at your bank.

**AUTOMATIC SAVING IS SURE SAVING — U. S. SAVINGS BONDS**



Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.





# UP TO **SAVE 85%** in **WAR SURPLUS...SENSATIONAL VALUES** at **"GADGETEER'S HEAVEN"** IN MANY ITEMS WE HAVE THE WORLD'S LARGEST SUPPLY

**NEW HYDRAULIC CYLINDERS, VALVES, PUMPS, FITTINGS, HOSE & TANKS**

51 sizes & types.  
World's Largest Supply  
1001 Labor Saving Adaptations for pulling, pushing, lifting operations. Finest precision workmanship and materials. Liquid and or air operation, developing terrific power.

**20,000 Available WRITE FOR CATALOGUE**  
PRICED TO SELL AT 15% GOVT. COST.

**PUMPS**  
HYDRAULIC, VACUUM, AIR  
For every purpose at 15% of Value.

**P-1 Hydraulic Pesco Type**  
Positive displacement gear type.  
Capacity: 1 gal. per min. at 1500 R. P. M. at 1500 P. S. I.  
Operating speed: 3750 R. P. M.  
Intermittent maximum 4300 R. P. M.  
Rotation: either direction with slight adjustments.

**\$9.49**

**P-4 VICKERS**  
Positive displacement angle piston type.  
HYDRAULIC  
Capacity: 6 gal. per min. at 3000 R. P. M. at 1500 P. S. I.  
Operating Speed: 3750 R. P. M.  
Intermittent maximum 4300 R. P. M.  
Rotation: to right only.

**\$14.49**

**PV-1**  
May be used as air or fuel pumps for pressure or vacuum.  
Will pump 7 1/2 gals. oil at 300 R. P. M. Builds air pressure 30 lbs. per sq. in. at 1500 R.P.M.  
Vacuum draws 36 in. of mercury at 1750 R. P. M.

**\$9.49**

**ROMEC FUEL**  
800 GPH at 30 PSI. can also be used as hydraulic for 4 GPM at 400 PSI. or for Vacuum drawing 15 in. mercury at 1500 RPM.

**\$6.29 ea.**

**NEW PRESSURE TANKS**  
Stainless steel - Shatter proof. Rustless. 10,000 available in 3 different sizes. 1001 uses. G-1 12 1/2 x 24 inches - 3100 Cu. in. capacity \$4.75  
D-2 8 1/2 x 24 in. - 300 Cu. in. capacity \$2.49  
F-1 - 10" x 18" 1000 Cu. in. Capacity \$3.95  
F-2 6 x 45 in. - 1000 Cu. in. capacity \$3.95  
A-4 5" x 8" 104 cu. in. Capacity \$1.35  
A-6 3 1/2" x 15" 280 cu. in. Capacity \$1.95

Perfect portable air tank to carry air in car or trailer. Ideal for painting, cooking, spraying, ocean buoys, underwater fishing or diving.  
#OR-1 Oxygen Regulator with 500 lb. gauge will fit all tanks \$1.39

**DC GENERATOR 140 AMP**  
Direct Current Generator, especially suited for adaptation to homemade welding unit.

A fast moving item at **\$15.95**

**P-1 GENERATOR 200 AMP** **\$22.50 ea.**

**R-1 GENERATOR 300 AMPS.** **\$29.50 ea.**

**BEARING MIX**  
Needle, ball and roller bearings in excellent assortment. Sizes from 1/2" to 2".  
#170 Introducing this treasure chest assortment of 15 Bearings at **\$2.95**

**SPRING MIX**  
Torsion, compression and tension springs. Assorted sizes. #206  
**2 lbs. 89c**  
A treasure chest for emergencies

**Here's a Real "Lite Special"**  
Farm, Auto, New U. S. Navy Portable Pistol Grip. Sealed Beam, 12v. Search Spot or Emergency. Light - featherweight! Gov. Cost \$35.00 our price **\$2.95**

3 Extra tilters - Red, Green & Amber 93c Set

**NEW FLEXIBLE GOOSENECK LAMP**  
110 V. A. C. 13 ft. wire with socket, switch and plug. In mounting bracket suitable for home or workshop. Wire alone worth our price of **99c each.**

**BATTERIES**  
NEW! FULL STRENGTH FOR PORTABLE RADIOS, SIGNAL LAMPS, BOATS, ELECTRIC TRAINS, ETC.

#516 9 Volt 8 1/2 x 6 x 4 in. **79c**  
3 run 27 Volt motor. **69c**  
#517 6V & 1 1/2 Volt Battery **69c**

**VALUABLE GEARS BARGAINS!**

#112 8 to 1 ratio, spindle drive **\$2.98**  
6 to 1 with screw shaft **\$4.98**  
85 to 1 (can be used for radio, antenna, etc.) **\$3.95**  
#G-11 15-1 gear ratio **\$3.95**  
2 to 1 ratio 90° right angle **\$1.95**  
10 tooth bevel steel boxed gear **\$4.95**  
Flexible Gear Shafts With End Drives  
115 - 30" **69c ea.**  
115a - 60" **99c ea.**  
Radio tuning shafts that can be used as flex gear drives #115a 12 ft. 1/2" nut -15 tooth internal spline **\$1.95 ea.**  
#115b 25 ft. 1/2" nut 12 tooth with internal spline **\$4.25**  
#115a

**FILES** NEW NICHOLSON & KEARNEY & FOOT CO.

12" Amer. Std. flat 2nd cut dbl. cut sq. edges tapering sides aid. tang New **49c ea.**  
14" Amer. Std. Mill type, bastard angle, cut sq. edges, tapering sides, aid. tang new **69c ea.**  
12" Used Vixen Files 35c ea. 10" **29c ea.**

**HOBBYISTS!**  
An Unequaled Value!  
**GADGET MIX**  
Rivets, spacers, Clamps, bolts, nuts, Radio parts, gears, etc.

A gold mine 5 lbs. **\$1.19**

**PIANO HINGE**

Overall Width	Length	Price
1 1/4" (3/4" side)	72" alum.	\$1.00 ea.
2" (1" side)	72" alum.	\$1.19 ea.
1 1/2" (3/4" side)	53" cad. steel	.75 ea.
3 1/2" (1 1/4" side)	33" steel	\$1.00 ea.

**WINCH HOIST**  
now equipped with mounting frame, handle, cable, etc. complete. Thousands of Satisfied Users! Hundreds have written, telling us it's the most wonderful tool in the world!  
Capacity 2500 lbs. 20:1 ratio  
Bronze Worm Gear  
Ideal for Garages, Truck loading, Machine Shops, Boat Builders, etc.

**\$15.59**

**FIRE EXTINGUISHER** Kiddie Lux Co2 Type. Built to Gov't. spec. 3 1/2 lb. wheeled shatterproof heavy case 20" x 4". Trigger controlled with horn. fully recharged. #79 Type. \$30.00 value #501A **\$11.75**  
2 lb. CO2 type \$22.50 value #402 **\$8.75**  
10 lb. Chgd. CO2 with Horn \$60.00 value #60 **\$27.50**  
14 lb. Chgd. CO2 with horn. #505a New 15 lb. CO2 Break die type with horn. \$70. value **\$33.95 ea.**  
#505b New 15 lb. CO2 squeeze type with horn. \$80. value **\$42.50 ea.**  
Indispensable for small or large plane, trucks, auto, home, factory.

**JEEP CANS**  
Used but good condition. non-leak. 5 gal. gas or oil. self-locking screw cup type 18" x 6 1/4" x 13" Wide **\$1.19 ea.**  
In lots of 5 **\$1.09 ea.**  
25 or more **\$1.05 ea.**

Self locking, flexible screw spouts with brass filter at end. 1" I.D. x 16" lg. **39c**

**New Electric Motors**  
#500 new 1/2 H.P. 27 Volt D. C. 24 Volt A. C. This motor can be readily adapted to 110 A. C. by the simple method of rearranging armature brush leads. We furnish free diagram of instructions with each order. A Sensational Value @ **\$5.95**

Converted to 110 A. C. Equipped with plug and 3 1/2 ft. Heavy Duty Cord **\$8.49 ea.**

1 16 H. P. 24 Volt D. C. Motor. Series Wound. New. #501 **\$3.95 ea.**  
#502 - 2 H.P. 24 V D.C.M. used. **\$8.95**  
COMPRESSOR, 1000 lb. pr. 2 stg. with 1/2 H. P. 27 V. D. C. motor. **\$17.95**  
Tank and Fitting

**4 INCH PAINTERS DUSTER BRUSH** Only **59c ea.**

**PEXTO PLIERS** Side cutting beveled head a \$3.50 Value Only **\$1.79**

**PLASTIC Mallet** clear, with 2" dia. 8 1/4" lg. head. 12" handle, for soft metal or plastic work where fine non-marking or tapping is desired. A \$2.50 Value for Only **79c ea.**

**METAL SNIPS** Compound action. Hard steel blades. Expansion spring. Locking device. Right Hand and Left Hand **\$2.59**

**PLASTIC PARALLEL STRAIGHT EDGE** with knobs and rubber pads for non slippage on each section. A must for navigators, mechanics, draftsmen, engineers... You've never seen 'em at **97c ea.**

Order Direct from this ad. All Sales Final. Pay by Money Order or Check. P. O.'s accepted from Dun & Bradstreet firms. All prices F. O. B. Los Angeles. 1/3 Deposit with C. O. D's.

**PNEUMATIC AND AIR TOOLS**  
10,000 in various popular makes, sizes, types. Cleco, Aro, Ingersoll Rand, Chicago, Pneumatic, Buckeye, etc.

**RIVET** #180 Gooseneck **\$1.80**  
#181 Pistol **\$1.80**

**GUNS** Pistol & Goose-neck Type 101 Uses Chipping, Boreing, Hammering, Breaking cement and auto body work.  
Chicago Pneumatic, Cleco, Ingersoll Rand Makes. E3, E2, 3X, 2X, OY \$55 Value **\$8.95**  
#186 Squeezer **\$15.95**

**AIR DRILLS OR MOTOR SPECIAL** with 1/4" JCB Chuck Straight **\$12.95**

**PNEUMATIC ANGLE DRILL** With Terry Adapter ea. **\$12.50**

**CHI. PNU. IMPACT WRENCH** Model 337rs 3/8" sq. dr. 1/2" & 3/4" revrs. 6 spd. cntrl. **\$17.50**

Send for Catalogue and List of Other Sizes, Types of Pneumatic Tools.

**HIGH PRESSURE OXYGEN BOTTLE**  
New. Will hold up to 3,000 lbs. PSI with Co2 used as tire inflator or fire extinguisher, with oxygen for sick room or deep-water diving, etc. Completely equipped with brass valve, 36" hose, dial gauge, & canvas bag **\$2.29 ea.**

**ABRASIVE & GRINDING WHEEL MIX** 50 pcs. including honing stone, pen- oil rolls, wheels, abrasive sheets, etc. A Real Value for Only **99c**

**HINGE MIX** 12 pairs of strap butt Hinges, sizes 1" x 1" to 1 1/2" x 4" in length, to 8" strap. A \$3.00 Value for Only **\$1.09**

**AIRCRAFT CABLE** Alloyed steel, rust resistant, 3 16" dia. 18 ft. long, with turnbuckle ends. On reels in any length **99c ea.**

1/16"	3c ft.	5/32"	5c ft.
3/32"	4c ft.	3/16"	6c ft.
1/8"	4 1/2c ft.	9/32"	8c ft.

**RUBBER GOODS**  
NEOPRENE SHEET RUBBER

Thick- ness	approx. Width	Price per sheet, yd.
#325 .020"	1/84	.75
#326 .037"	1/32	1.00
#327 .064"	1/16	1.75
#329 .125"	1/8"	\$4.75

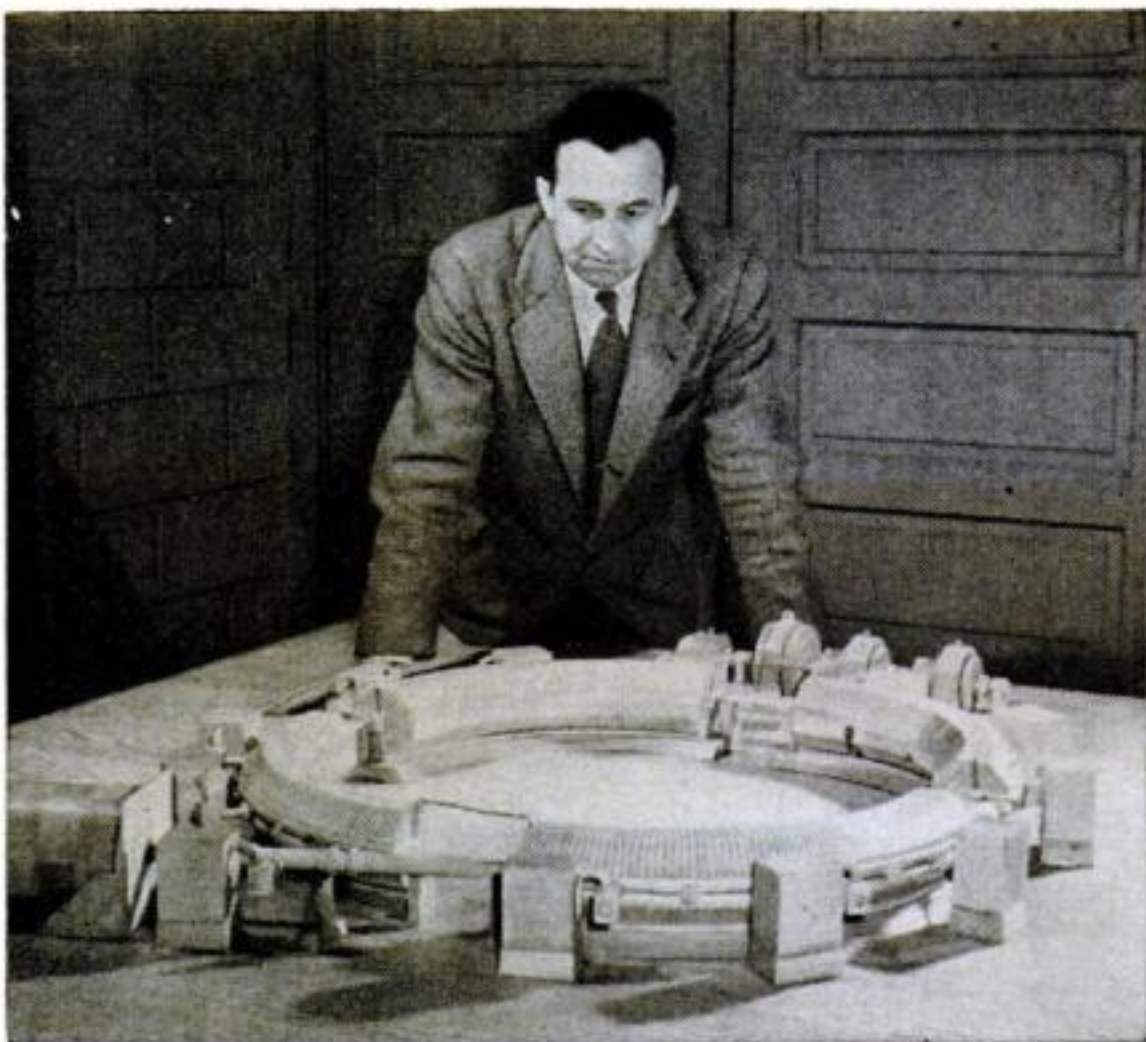
Item #329 is laminated rubber sheet with cloth center. Flexible but very fine for hv. wear.

**PALLEY SUPPLY CO. THE LARGEST FIRM OF ITS TYPE IN THE WORLD** DEPT. P. S. 78 — 6321 SAN FERNANDO RD. GLENDALE 1, CALIFORNIA



TO: *Reader*  
FROM: *Editor*

# They Dreamed about Atoms



**B**ECAUSE a dream of theirs is coming true, some of the country's leading physicists are walking on air.

One of them is Prof. E. O. Lawrence of the University of California, inventor of the cyclotron and America's No. 1 atom smasher. Another is his former co-worker, Dr. M. Stanley Livingston, who now heads the Accelerator Project at Brookhaven National Laboratory, Upton, N. Y. Last January, *POPULAR SCIENCE* told of their dream.

They and their research teams envisioned a ring-shaped atom-smashing engine so gigantic that even the great 184-inch cyclotron of the University of California would be a toy beside it. It would have a power of billions, instead of millions, of electron volts. It would need the most secure anchorage to keep the energy surging through its ring magnet from tearing it loose from its foundations. Its sound effects would out-Hollywood Hollywood.

This mighty tool would enable the physicists to probe, at last, some of the innermost secrets of the atom—the explanation of the “glue” that holds its nucleus together, the nature of mesons and other subatomic particles still cloaked in mystery. It would permit much larger scale experiments with man-made mesons, recently created artificially for the first time in the University of California cyclotron. Its revelations might lay the groundwork for the next great discoveries in an atomic age that has already given us the A-bomb, “artificial radium” to

cure disease, and the promise of power from uranium piles.

Since *POPULAR SCIENCE*'s article was published, the U. S. Atomic Energy Commission has announced that it will finance the construction, not only of one, but of two such machines—one at the University of California and the other at Brookhaven.

California's \$9,000,000 atom smasher, a monster with a ring magnet 110 feet in diameter, will wield a power of 6,000,000,000 electron volts. Brookhaven's \$3,000,000 machine, of 60-foot diameter, will attain 3,000,000,000 electron volts. And even the ultimate power that the dreamers had let their imagination picture—10,000,000,000 electron volts from a \$15,000,000, 160-foot-diameter machine—may yet be realized. Design ideas for this colossus will be tested with the projected installations.

What an atom smasher in the billion-volt power range will look like is shown by the photo above, in which Dr. Livingston is examining a model of Brookhaven's design. Its enormous ring magnet, the doughnut-shaped object, encloses a vacuum tube that serves as the barrel of the mighty “gun.”

Due to begin this summer or fall, construction of the superpowerful machines is more than a personal triumph for their planners. It means that America will lead the world in physical research at the most important time in history to do so.

*Alden P. Armagnac*



Page 10 of 10

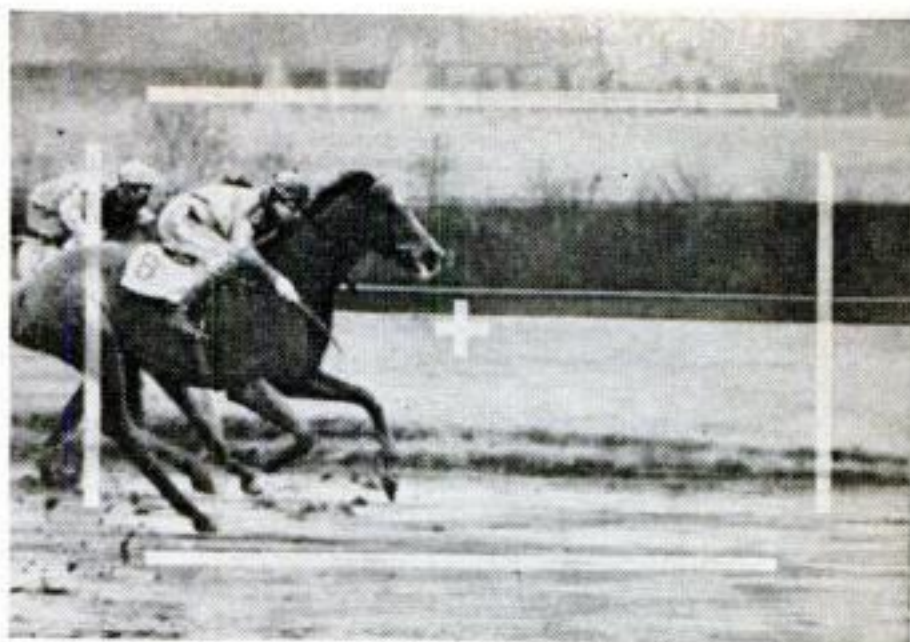
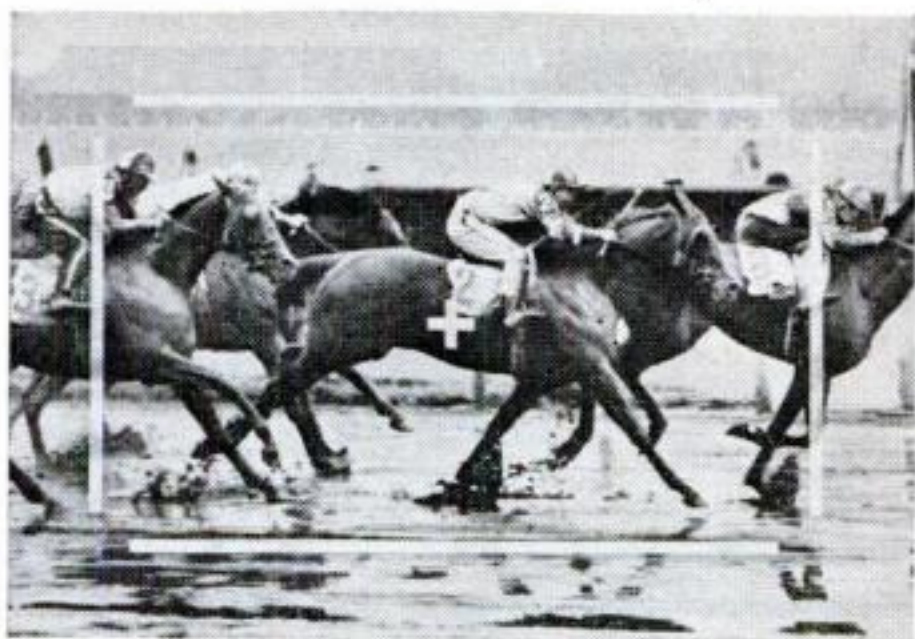
**This One**



**1AGW-SG3-U7PX**

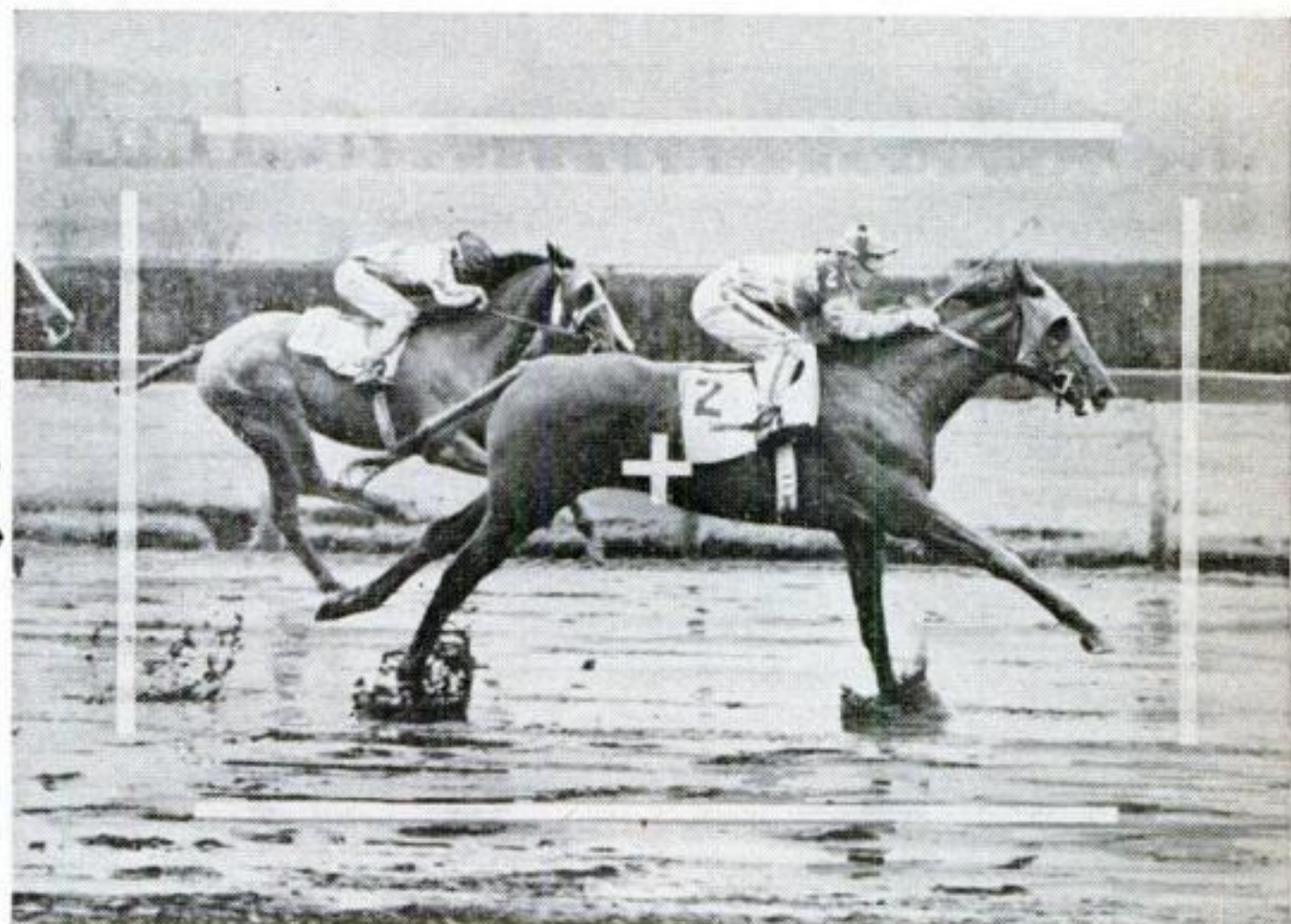


**No! Not yet!** ↓



↑ **No! Not now!**

**NOW!**



TRADE MARK

*The Argus Markfinder\* tells you* **WHEN!**



● F3.5 Anastigmat lens; coated, color corrected. Double-exposure guard. Accurate shutter speeds from 1/10 to 1/200. Handsome leather case. Lens is removable for use on enlarger.

Normally, it's a tough shot, capturing a photo-finish in your finished photo. But try it with the Argus Markfinder sight! One glance through Markfinder and you see your subject centered on a cross-mark, "framed" within guidelines. Then for a perfectly composed picture follow the subject till the action is right . . . and click! The picture you get is the picture you see. No tilting! No cropping! Argus Markfinder lines you up no matter where you place your eye. Sight through the Markfinder today. Ask your Argus dealer about the Argus 21.

**ARGUS, INC. • ANN ARBOR, MICH.**

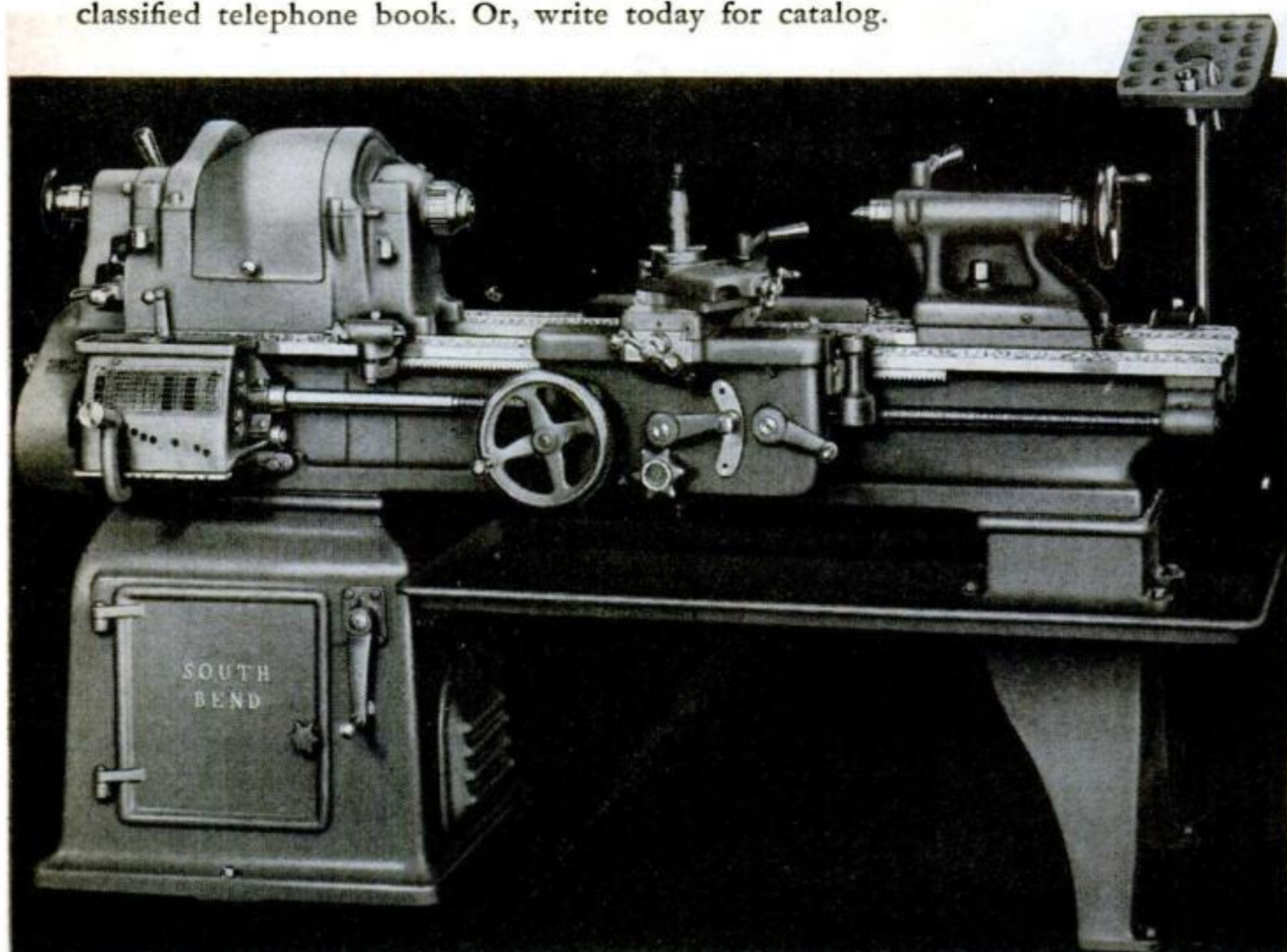
**Only Argus has the *Markfinder***

JULY 1948 271



**SOUTH BEND PRECISION LATHES** have solved the production of precision parts for many manufacturers. Their accuracy, speed and adaptability to a wide range of operations contribute to efficient machining. Perhaps you are running some small, precision jobs on slow, heavy machines. If so, you should find out about South Bend Precision Lathes. These are the kind of jobs for which they are built. Their use can often effect appreciable savings. And, being reasonable in price, they can be installed without excessive capital investment.

Call our local distributor for complete information. You will find his name listed under "Machine Tools" or "Lathes" in your classified telephone book. Or, write today for catalog.



**16'' X 6' TOOLROOM LATHE** with handwheel collet attachment; collet rack; taper attachment; micrometer carriage stop; chip pan; thread dial; 3 phase, 60 cycle, 220 volt motor; and drum switch. Catalog No. 8117-C.

**\$2031.50**

#### PRICES OF SOUTH BEND LATHES

LATHE SIZE	16'' x 6' LATHE	14½'' x 5' LATHE	13'' x 5' LATHE	10'' x 3' LATHE	9'' x 3' BENCH LATHE
QUICK CHANGE GEAR MODEL	\$1640.50	\$1382.50	\$1153.50	\$863.60	\$312.70
TOOLROOM MODEL	2031.50	1735.50	1481.50	1151.60	481.70

*Prices include 3 phase, 60 cycle, A. C. motor and drum switch — f. o. b. factory*

**SOUTH BEND LATHE WORKS**

*Building Better Tools Since 1906*

**456 EAST MADISON STREET, SOUTH BEND 22, INDIANA**





**NEW**

# AUTO-LITE *Resistor* SPARK PLUG

**NEW  
BUILT-IN  
"RESISTOR"  
AIDS  
PERFORMANCE**



**New Auto-Lite Spark Plug Has Built-in "Resistor" That Helps Deliver Smoother Idling, Better Radio Reception—Gives Improved Economy and Longer Electrode Life**



## **Gives smoother engine idling**

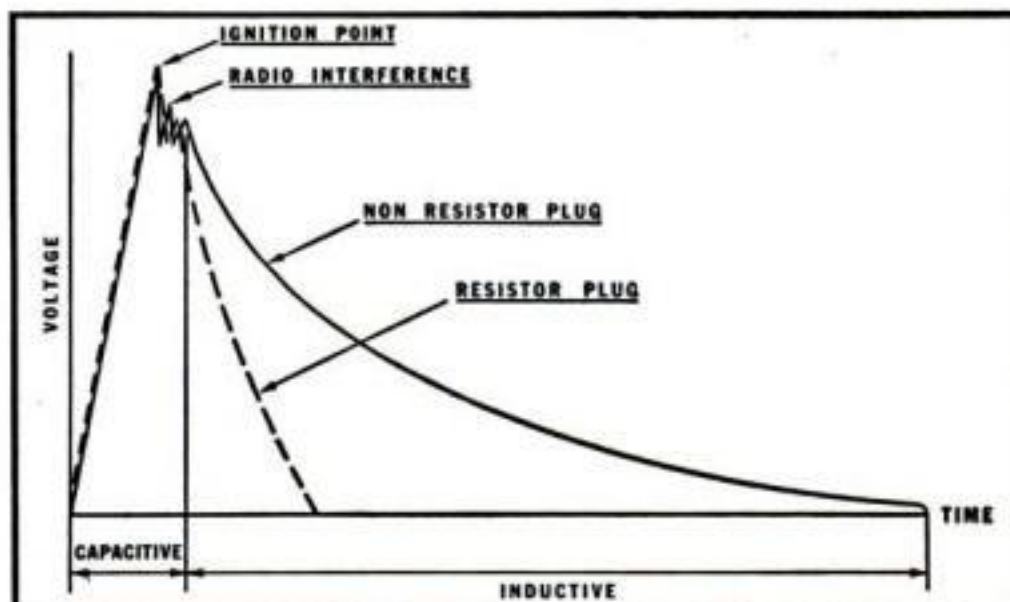
—because of the wider initial spark gap setting possible on the "Resistor" plugs. This assists in burning leaner mixtures, and reduces misfiring at idling and throughout the speed range.

## **Improves radio reception**

—by suppressing spark plug interference with radio, radio-telephone, radar and television reception. (Under 35 mv/m from 540 kc. to 150 mc. at 50 ft.)



**A**UTO-LITE Ignition Engineers, working with leading automotive manufacturers, have developed the new Auto-Lite "Resistor" Spark Plug with this built-in resistor for improved operation and economy. Regular type Auto-Lite Spark Plugs (patented U.S.A.) will continue to be manufactured.



## **Reduces electrode gap growth**

—by increasing electrode life up to 200% and more . . . due to the virtual elimination of the inductive component in the spark discharge.

• • •

All spark plugs, including the new Auto-Lite Resistor Plug, ignite the fuel on the first peak of the capacitive component. However, the Resistor Plug dampens the remaining peaks so that radio, radar, and television interference is held to an acceptable level. Also, the Resistor virtually eliminates the inductive component that serves only to burn away the electrodes on ordinary plugs. The gap life is thus increased, making possible wider initial gap settings.

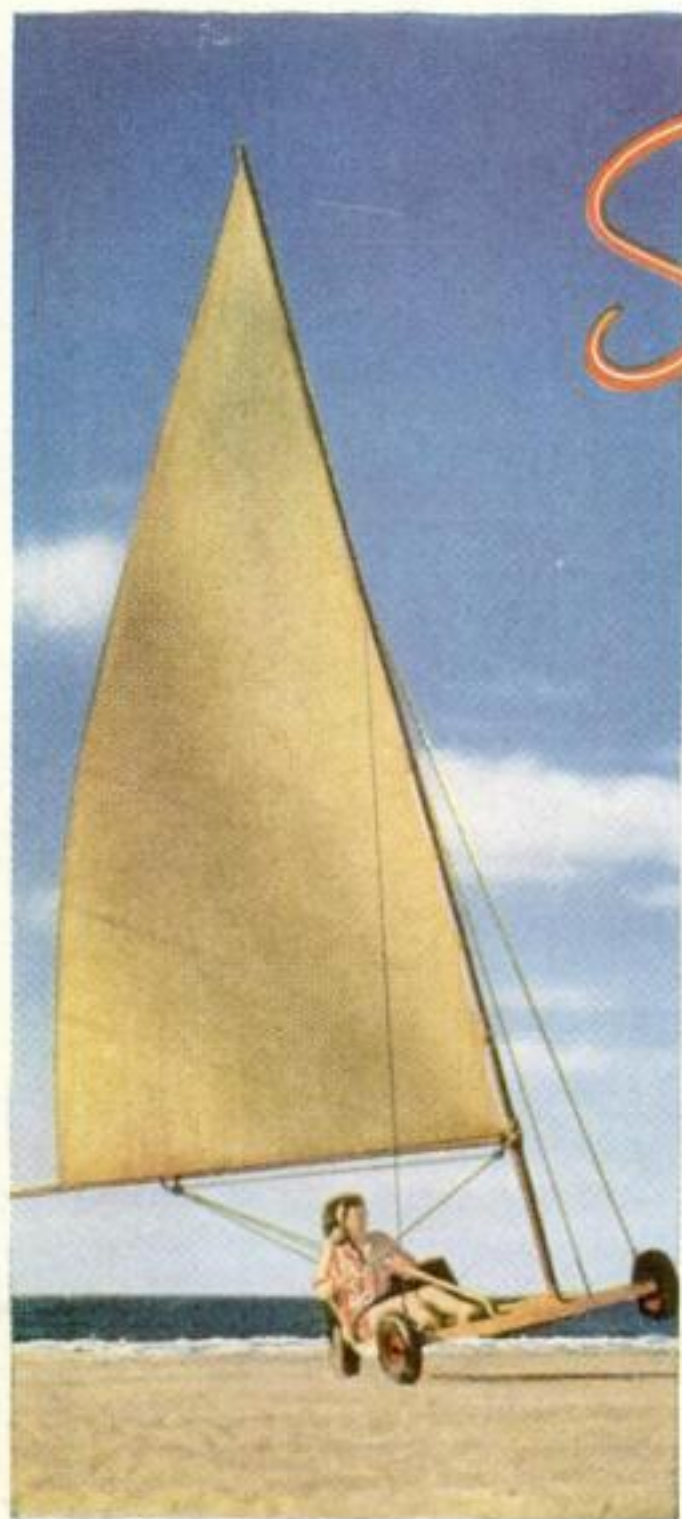
**THE ELECTRIC AUTO-LITE COMPANY**

Toronto, Ontario

Toledo 1, Ohio





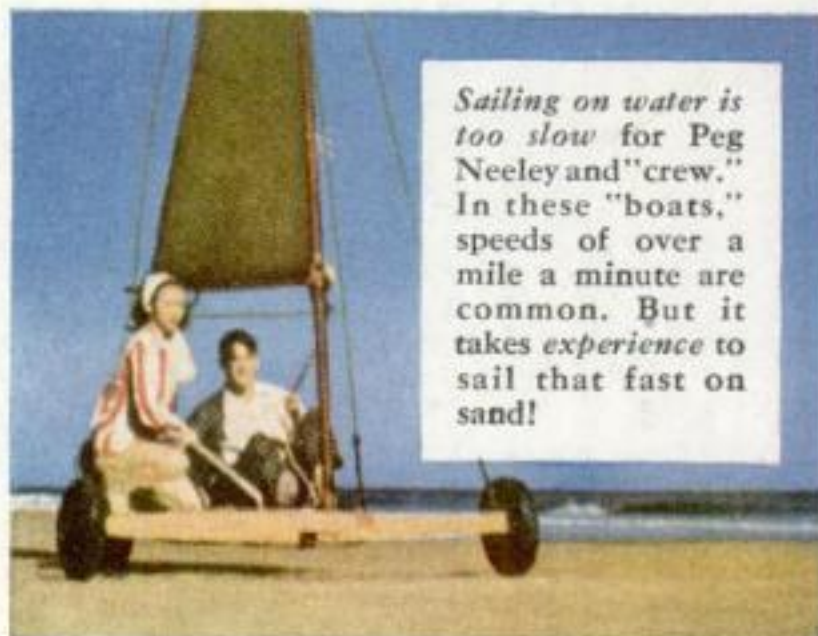


On Florida's Daytona Beach, Skipper Peg Neeley "beels over" in a stiff breeze.

IT TAKES EXPERIENCE TO GO

# Sailing on the Sand

Skipper  
**PEG NEELEY**  
agrees: "In sand  
sailing—and in  
cigarettes too—  
**EXPERIENCE**  
**IS THE BEST**  
**TEACHER!"**



*Sailing on water is too slow for Peg Neeley and "crew." In these "boats," speeds of over a mile a minute are common. But it takes experience to sail that fast on sand!*



I'VE TRIED  
MANY BRANDS  
...CAMELS  
SUIT ME BETTER  
ALL WAYS!

CAMELS  
ARE THE  
CHOICE OF  
EXPERIENCE  
WITH ME

Let your "T-ZONE" tell you why

## More people are smoking CAMELS than ever before!

R. J. Reynolds Tobacco Company, Winston-Salem, N. C.



**The "T-Zone"**  
**T for Taste...**  
**T for Throat...**  
that's your  
proving ground  
for any ciga-  
rette. See if  
Camels don't  
suit your  
"T-Zone" to  
a "T"!

THE CHOICE OF  
EXPERIENCE

**M**OST everywhere you go—you see more people smoking Camels. You'll understand the reason why—when you try Camels . . . and *compare* them . . . in your "T-Zone" . . . that's T for Taste and T for Throat. See how *your* Taste welcomes Camel's rich, delightful flavor. See if *your* Throat doesn't welcome Camel's cool mildness. Let *your* experience in *your* "T-Zone" tell you why more people are smoking Camels than ever before!

According to a Nationwide survey:  
**MORE DOCTORS SMOKE CAMELS**  
**THAN ANY OTHER CIGARETTE**

Three leading independent research organizations asked 113,597 doctors what cigarette they smoked. The brand named most was CAMEL!